METAL SHARK® 2 BD

English **Operator's Manual**

Software Version 1.10a and higher

Index

3. Safety Messages

3.1. Safety Symbols and Definitions

In this manual we use the following safety symbols. These symbols are supposed to draw the readers attention especially to the text next to the safety symbol.

General Danger!

This Symbol indicates that there is a potential danger for life and health.

Danger due to High Voltage!

This symbol indicates that there is a potential danger for health and life due to high voltage. Only qualified electricians are allowed to carry out tasks that are marked with this symbol.

Danger due to Moving Parts!

This symbol indicates that exposed moving parts may injure your fingers or hand.
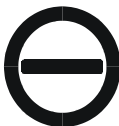
Caution!

This symbol indicates that there is a potential danger for machinery, material or the environment.

3.2. General Safety Instructions

Danger!

Before working with the metal detector read these safety instructions thoroughly.

Never put the metal detector into operation without the safety devices provided by the manufacturer. Only specially trained maintenance staff is allowed to operate the equipment without the safety devices.

Shut down the machine immediately if the safety devices are not operating properly or if there are other apparent defects which pose a danger. Any defects must be eliminated or reported immediately.

Always observe any warning signs attached to the machine. They help prevent dangerous situations. The removing of these warning signs is strictly prohibited.

Never put the metal detector into operation
- if you have not received complete initial training from the owner,
- if you have not fully read the operating instructions or
- if you have not fully understood the operating instructions.

Not operating the machine correctly may result in severe injury or damage.

Entering the area of the equipment is strictly prohibited for unauthorised persons. An unauthorised person is a person who has not been instructed to work on the metal detector.

Wear closely fitting working clothes which cannot get caught in rotating parts (e.g. conveyor belt).

Keep the floor at your place of work clean. Remove oil and obstructions immediately.

Open flames and smoking are not allowed.

Motor control equipment and electronic controllers are connected to hazardous line voltages.

Never touch any live parts. Electric shocks may lead to severe injury or death.

Disconnect power before checking controllers or performing maintenance, be sure equipment is properly connected to Protective Earth (PE).

During servicing or maintenance work always wear insulated safety shoes with thick crepe soles and safety glasses.

Report any damaged cables to the maintenance staff immediately.

Keep all access doors to the electrical equipment locked.

Do NOT operate the machine without guards in place.

Do NOT touch parts marked with this symbol during machine in operation.

3.3. Safety Instructions for the Metal Detector

Attention!

Smooth and safe running of METAL SHARK® BD Metal Detectors is only possible if the following measures have been taken.

3.3.1. Installation Instructions

Always attach an earth clamp for welding equipment directly next to the weld.

Never allow the welding current to flow through the housing of the metal detector. This would damage the metal detector beyond repair.

3.3.2. Connecting Instructions

- Make sure that the mains voltage is the same as that required for the equipment.
- The detector must be fitted and connected up by trained staff only.
- Observe general installation regulations for setting up and operating electrical equipment (VDE 0100).
- Consequently, never perform any work on the metal detector when it is switched on.
- Take precautions to protect human life and the machine in accordance with the local conditions and regulations.
- The Metal Detector METAL SHARK® 2 BD series is designed for permanent, steady-state installation.
- Never connect or disconnect control cables or coaxial cables whilst the metal detector is switched on.
- Never connect mains cables, control cables or coaxial cables incorrectly.
- Observe maximum operating voltage and the current-carrying capacity of the output contacts.
- Use screened/twisted-wire mains and control cables.
- Never lay the mains cable and control cable together in a single cable run.
- Make sure the metal detector is properly earthen (protective earth - PE).

3.3.3. Instructions about Operation

To prevent Metal Detector METAL SHARK® series from ageing prematurely or being damaged beyond repair, please observe the following instructions:

- The metal detector should always remain switched on. This will maximise the service life of the electronic circuitry.
- Only operate the metal detector under suitable conditions (refer to chapter "*3.2.1. Normal Use*").

3.3.4. Protection against Interference

The mains input of the metal detector is protected against interference.

A high level of operational reliability and additional protection against malfunctions is achieved by the following measures:

- Use of mains filters if the mains voltage is affected by the switching-on of heavy-load appliances (compensation systems, welding equipment, HF furnaces, solenoid valves, etc.).
- Providing suppresser circuits for inductance appliances (solenoid valves, contactors, electromagnets) using RC elements (Resistor/Capacitor elements) in order to absorb the energy being released by switching off.

4. Getting Started

Here we provide an overview of the actions you have to take before starting to work with the metal detector METAL SHARK® 2 BD.

1.	**!**	Read the safety instructions. *Note: For more information read chapter "1. Safety Messages".*
2.	**i**	Become familiar with the metal detector. *Note: For more information read chapter "4. Technical Description".*
3.	🪝	Move the metal detector to the location where you want to install it. *Note: For more information read chapter "5. Transport"*
4.	🔧	Install the metal detector mechanically. *Note: For more information read chapter "6. Mechanical Installation"*
5.	⚡	Check the metal detector's electrical installation and connect the mains power. *Note: For more information read chapter "7. Electrical Installation"*
6.		Become familiar with the control panel and the main screens. *Note: For more information read chapter "8. Control Panel and Main Screens"*
7.	SETUP	Set up parameters for initial operation. *Note: For more information read chapter "9. Initial Parameter Setup"*
8.	TEACH	Teach products, optimize stability and sensitivity, check the performance and then start your normal production. *Note: For more information read chapter "10. Daily Operation Overview", "11. Daily Operation" and "12. MENU - Daily Operation Setup"*
9.	MENU	If necessary change further settings of the METAL SHARK® 2. *Note: For more information read chapter "13. MENU - General Settings"*

5. Introduction

5.1. General Information

5.1.1. Information about this Manual

Validity: Metal detector type METAL SHARK® 2 BD BD
Manufacturer: CASSEL Messtechnik GmbH
                              In der Dehne 10
                              37127 Dransfeld
                              Germany
Print date of this manual: 27. October 2009

5.1.2. Content of this Manual

This manual contains all general information that is necessary for setting up and running METAL SHARK® 2 BD Metal Detectors.

This manual was compiled in October 2009 according to the guidelines of the European standard EN ISO 12100-1 and EN ISO 12100-2, „Safety of machines". It completes the existing national regulations for accident prevention that you have to follow when running such machines.

Before the initial operation of the metal detector all persons that are authorised to work on and with the metal detector have to read and understand this manual. Additionally, the employer should provide short information on what to do and not to do with the machine. Special interest is to be paid to the safety instructions.

The manual must stay with the metal detector. All authorised persons must have access to it at any time. You are not allowed to remove any chapters from this manual. A missing manual or missing pages (especially "*1. Safety Messages*") have to be replaced immediately.

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5.1.3. Target Group for this Manual

This document is directed to operators and quality managers as well as company technicians with the following tasks:

- operation of the metal detector,
- regular inspections,
- safety check before and during the work with the metal detector,
- maintenance of the metal detector (company technicians only).

5.1.4.   Typographic Conventions

Here the different text formats are explained.

Example	Type
Histogram shows the last 232 signals and what they were about	Important expressions
Press MENU to open the menu. Press ESC to return to the main screen.	Function Keys
Select SYSTEM MENU...	Menu Points
dry: Products with low...	Menu Parameters
BAUDRATE RS232 (A040) sets...	Parameter Code
Note: *Do not ...*	Hints
Refer to chapter "*3.2. Scope of Application and Qualification*"	References
...the error message PVS Test Elapsed.	Errors
Danger!	Safety hints

5.2. Scope of Application and Qualification

5.2.1. Normal Use

The Metal Detectors of the METAL SHARK® 2 BD series are solely designed for detecting foreign metal bodies in non-metal products. Metal can be detected in products that are in a

- solid,
- liquid or
- powder

form.

In addition you have to secure that the metal detector is only operated when standing in a stable position.

Note: Refer to chapter "4.3. Technical Data" for more information.

5.2.2. Misuse

The METAL SHARK® 2 BD series is not designed for uses other than those listed in chapter *"3.2.1. Normal Use"* otherwise it is regarded as misuse. In particular, pay attention to the fact that it is not allowed

- to change or remove safety components from the metal detector or the associated peripheral equipment in order to perform measurements other than those indicated in chapter *"3.2.1. Normal Use"*,
- to use the machine for a purpose which is not approved,
- to convert the machine without consent from CASSEL Messtechnik GmbH in order to use it for a different purpose. Please bear in mind that if you convert the metal detector you are considered the manufacturer.
- to step on or climb over the machine (especially the conveyor belt),
- to transport humans or any kind of material with the metal detector

5.2.3. Owner's Obligation to Exercise Due Care

The METAL SHARK® 2 BD series has been designed and built taking due consideration of a hazard analysis and after careful selection of the harmonised standards to be observed, as well as other technical specifications. It is therefore state of the art and guarantees maximum safety.

However, in practical operation this safety can only be maintained if all the necessary measures are taken. As part of his obligation to exercise due care, the owner must take these measures and supervise their implementation.

The owner of the equipment must, in particular, ensure

- that the machine is only subjected to normal use ("*3.2.1. Normal Use*"),
- that the machine will only be operated if it is in good working condition and the safety devices are checked regularly to make sure they are operative,
- that the Operator's Manual is always in a legible state and is available in its entirety in a place accessible for all operators at any time,
- that only adequately qualified and authorised staff operates, services and repairs the machine,
- that before working with the metal detector for the first time, and also thereafter on a regular basis, the staff receives instruction on all the relevant issues regarding safety at work and environmental protection and that they are acquainted with the Operating Instructions and particularly the safety instructions therein,
- that all the safety signs and warnings attached to the machine are not removed and remain legible.

5.2.4. Requirements for Operating Staff

To operate the Metal Detector METAL SHARK® 2 BD series no special knowledge of measuring technology, mechanical engineering or electrical engineering is necessary. However, the operating staff must be at least 18 years of age and, before working with the metal detector for the first time, must have received training from the owner of the machine.

After receiving initial training the operating staff must be in a position to perform the following activities without supervision:

- Switching the metal detector on and off.
- Adjusting settings that password level 1 and 2 users are able to set up
- Being acquainted with the functions of the metal detector for daily operation ("*11. Daily Operation*") and being able to carry them out.
- Performing regular performance checks ("*11.2. TEST - Check Metal Detector's Performance*") and visual inspections on the metal detector.
- Inspecting the safety devices before and during operation.
- Eliminating minor malfunctions for which no occupational training in the field of mechanical engineering or electrical engineering is required (e.g. errors 1-7, "*14.1. Error Messages*").

5.2.5. Requirements for Service and Maintenance Staff

To be able to perform maintenance work properly, a period of occupational training in the area of mechanical engineering must have been successfully completed. However, only qualified electricians are allowed to work inside of electrical cabinets. Only trained maintenance staff is allowed to maintain METAL SHARK® 2 BD Metal Detectors.

For service and maintenance work on the metal detector knowledge of the English or German language is absolutely essential.

After initial training the service and maintenance staff must be in a position to perform the following activities without supervision:

- Same as mentioned in "*3.2.4. Requirements for operating staff*".
- Adjusting settings that only password level 3 users are allowed to set up (e.g. System Menu, Advanced settings in the Product Menu, refer to "*13. MENU - General Settings*")
- Locating and eliminating malfunctions ("*14.1. Error Messages*").
- Inspecting the safety devices on a regular basis.
- Putting the metal detector into operation and taking it out of operation.
- Maintaining and repairing the metal detector.

6. Technical Description

6.1. Method of Operation

METAL SHARK® BD Metal Detectors operate on the principle of inductance measurement, which is briefly described below.

The sensor has two coils:

- the transmitter coil and
- the receiver coil.

The pair of coils must be balanced before measuring. They are balanced automatically after switching on the metal detector. This is called „adjustment".

In the transmitter coil a generator is used to create a flow of electric current. This creates an electromagnetic alternating field (magnetic field) in the sensor.

If a particle of metal now passes through the metal detector — and hence through the magnetic field — the magnetic field of the transmitter coil changes. As a result of the change in the magnetic field an electric voltage is created in the receiver coil. This process is termed „electromagnetic induction".

The amount of voltage generated (induced) is directly proportional to the magnetic and electrical properties of the metal piece:

- Large metal pieces induce a higher voltage than small metal pieces
- Magnetic metals (e.g. steel) induce a higher voltage than non-magnetic metals (e.g. aluminium)

The voltage thus induced is measured and then processed and analysed by the electronic circuitry.

Since this method of measurement responds to

- electrical conductivity and
- magnetism

all types of metal are detected. However, magnetic metals are detected more reliably than non-magnetic ones. This way of measuring also makes it possible to detect metal particles inside the product or in non-metal packaging.

The examined products are not harmed or changed in any way.

6.2. Operating Limits

Not only metals but also many other materials and raw materials are more or less electrically conductive. The reasons for this can, for example, be that the products consist of

- salts,
- sugar,
- minerals,
- moisture or
- carbons.

This means that a voltage is constantly being induced in the receiver coil although there are no metal particles in the material being examined. This effect is termed „product effect" or „material effect".

The product effect has a characteristic value for each material. Since this value is constant within a certain bandwidth, it can be taken into account by the metal detector and compensated.

The level of sensitivity which can be achieved in practice often depends on:

- How well the metal detector compensates the product effect.
- How carefully the metal detector has been installed (e.g. strong vibrations, moving metal directly next to the sensor, electromagnetic interferences etc.).

6.3.   Technical Data

Nominal voltage	110 – 240 V, 50 – 60 Hz
Nominal power rating	100 VA
External fuse	min. 10A (slow blow), max. 16A (slow blow)
External wiring	1,5mm² or AWG 14
Internal fuse	240V / 1 A (slow blow)
Power dissipation	20W typ. / 60 W max.
Overload / overtemp protection	yes
Protection class	IP65
Operating temperature	-10 – +40°C
Storage temperature	-20 – +75°C
Relative humidity	20% – 85% (non condensing)
Operating altitude	2000 m
Dimensions WxHxD in mm	240x345x115 (Type D) or 296x345x115 (Type W)
Weight (controller only)	6 kg

6.4.   Metal Detector METAL SHARK® 2 BD

The metal detector METAL SHARK® 2 BD consists of at least two parts:

- **sensor head**,
- **controller** and
- optionally conveyor belt and reject device.
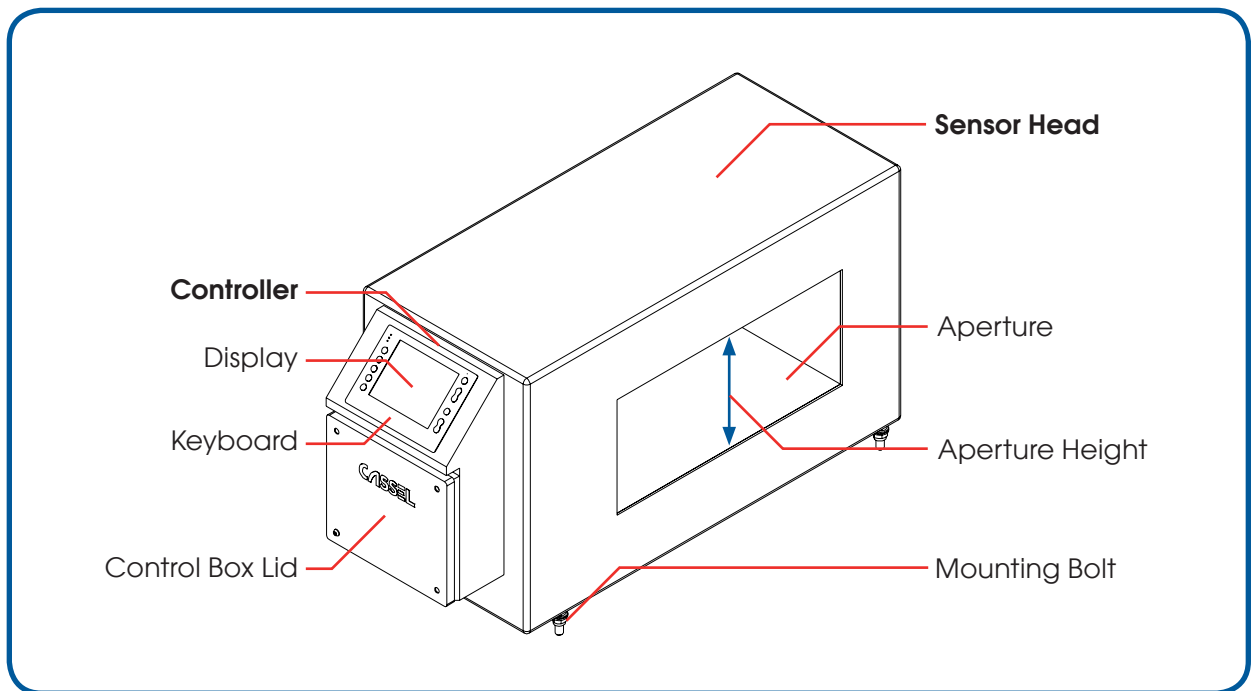
7. Transport

7.1. Safety & Protection Instructions

Danger !

To prevent damage to the machine and hazardous injuries when transporting and installing the machine it is absolutely essential that you keep in mind the following instructions:

• Only qualified personnel considering safety instructions is allowed to transport and install the metal detector.

• The machine may only be lifted using the frame provided.

• To transport the machine only the hoisting and sling gear specified here may be used.

• If the frame of the metal detector has rollers make sure that you only transport it on flat surface

• When selecting suitable hoisting equipment always take the following weights into account: depending on size and type, the metal detector can weigh up to 1,000 kg.

• A third person must secure the transport route.

• The transport routes must be cordoned off and secured so that no unauthorised persons may enter the danger zone.

• Sharp edges may cause injuries.

• Suspended loads may drop. There is a risk of fatal injury – never stay under suspended loads.

• Parts lying unsecured on top of one another may slip and drop.

• Only transport the metal detector after it is disconnected from the power supply.

• Also read chapter "*1. Safety Messages*".

7.2. Lifting

Choose suitable hoisting equipment. When choosing hoisting equipment always use padded cables or straps. Chains could lead to damage of the metal detector.

Only lift the metal detector at the frame provided (marked green in figure below)
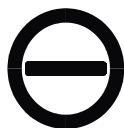
Caution !

Never lift the entire set of equipment at the sensor head or other parts marked red (see figure below). The heavy weight of the entire set of equipment may cause damage to the sensor head.

■ = Lift here!
□ = Do not lift here!

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8.   Mechanical Installation

The following points require special attention during installation:

- Metal-free zone
- Consider a gap between product and sensor head
- Vibration
- Feed of belt through sensor head
- Mounting on conveyor / frame
- Keep conveyor belt clean
- Welding of transversal struts and contact points
- Installation of sensor head

8.1.   Metal-Free Zone

A metal-free zone is required in front of and behind the sensor head aperture with a length corresponding to 1.5 times the aperture height.

Metal-free zone =
1.5x aperture height

Metal-free zone =
1.5x aperture height
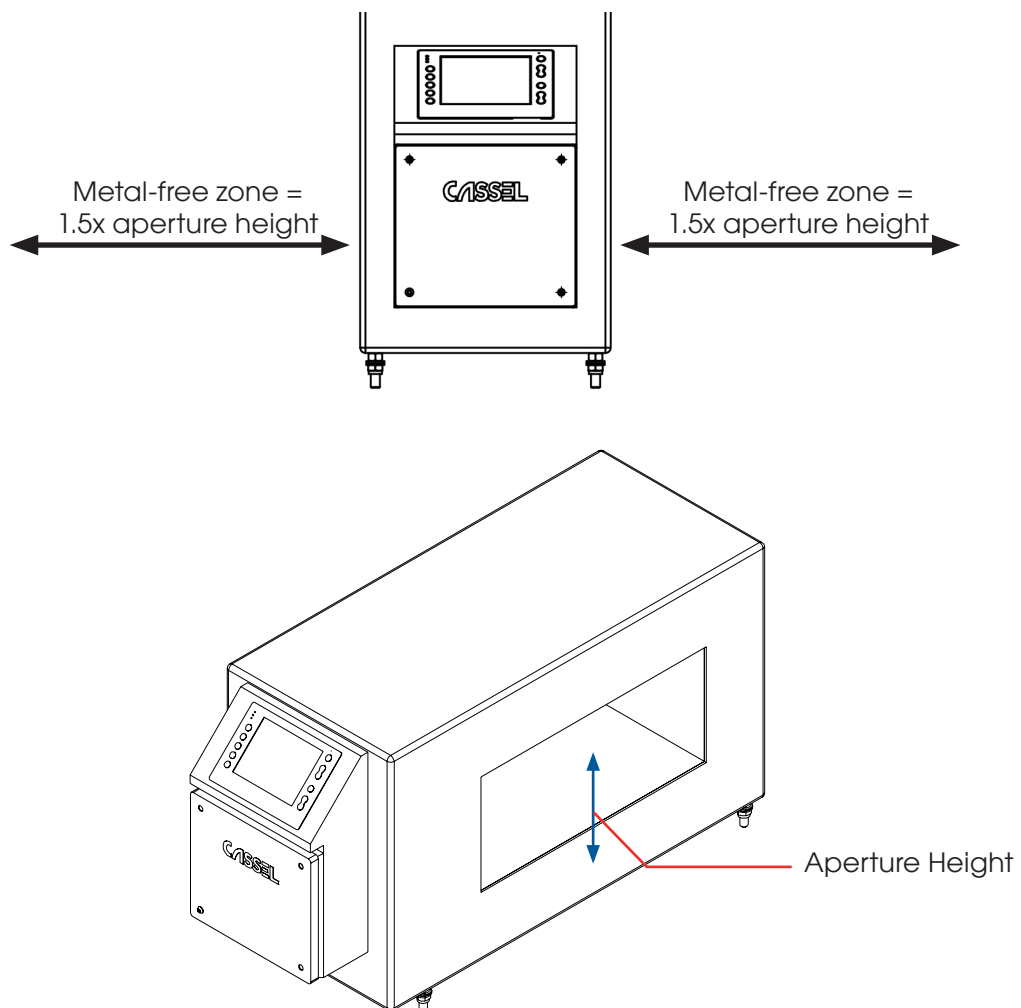
Aperture Height

8.2. Minimum Distance Between Motor and Sensor Head

Between motor and sensor head there must be a minimum distance of 1.5x aperture height. Otherwise the metal detector is affected by the magnetic field of the motor.
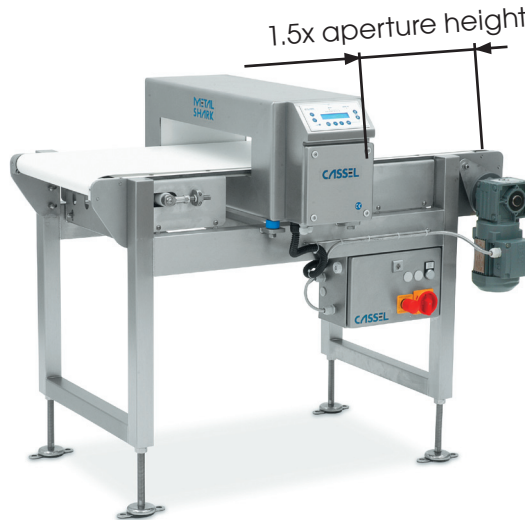
8.3. Gap Between Sensor Head and Product

If the product has a strong product effect consider a 40 mm gap (minimum) between sensor head and product for best metal sensitivity.
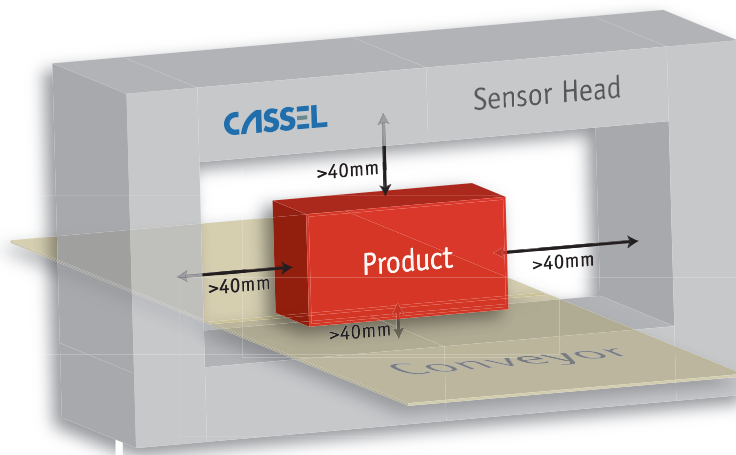
8.4. Vibrations

- Install the metal detector so that it is exposed to as little vibration as possible in operation.
- Light vibrations do not affect the metal detector.
- However, metal alarm can be triggered by a hard shocks.

8.5. Feed of Belt Through Sensor Head

- The detector is installed in the upper run of a conveyor belt.
- The transport belt is fed through the detector on a nonmetallic guide plate (such as a 16 mm plywood sheet) or tensioned to pass through the detector without contact.
- A minimum clearance of 5 mm must be maintained between the guide plate and the detector.
- The inside of the detector opening may not be touched by the guide plate, belt or fibre mat.

Nonmetallic guide plate

Gap min. 5 mm
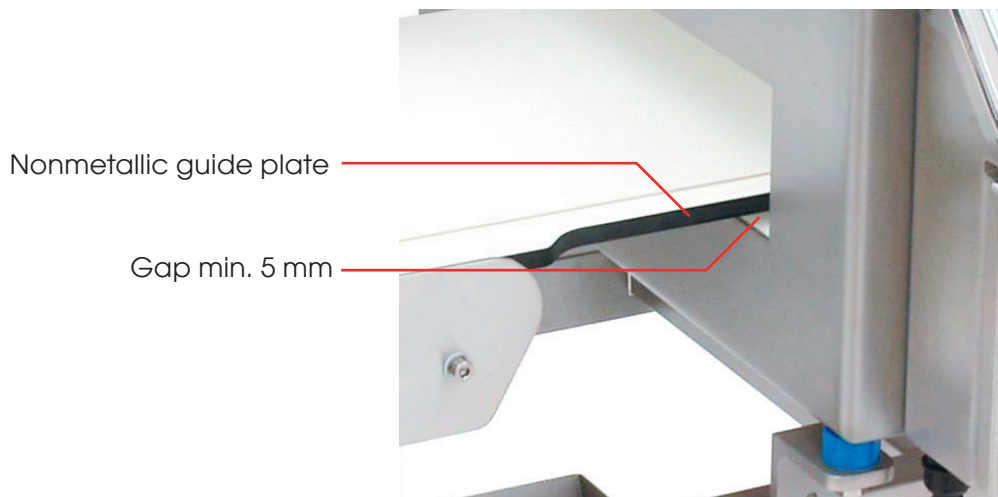
8.6. Mounting on Conveyor / Frame

- Ensure even and stable contact between metal detector and mounting bracket.
- The metal detector must not be subjected to any mechanical stress or tension during the installation and during tightening of the mounting bolts.
- Before installing, scrape off paint from the conveyor or mounting frame around all of the mounting holes for the metal detector. All of the mounting bolts must have good electrical contact to the conveyor or mounting frame.
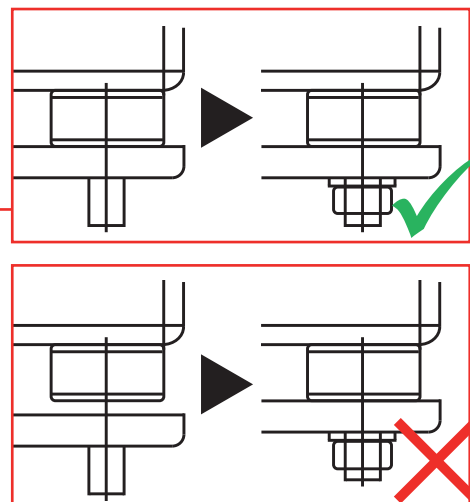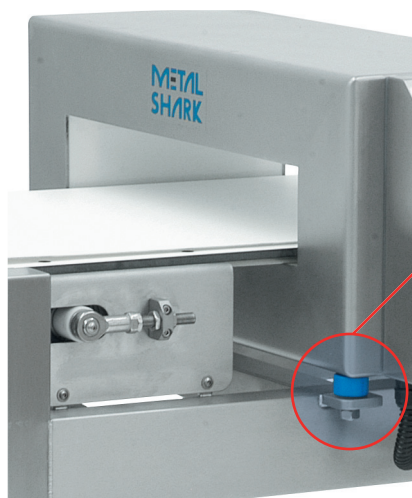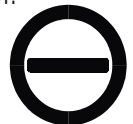
8.7.   Keep Conveyor Belt Clean

The transport belt must be kept absolutely clean. Even small metal particles and contamination could trigger a metal alarm on cycle of the transport belt.

The conveyor must be cleaned of metal swarf and dust before installation. Do not unpack the belt until immediately before installation.

- Do not walk on the conveyor belt without clean protective shoe covers or other protective measures. Visible or invisible shoe prints may contain metal particles.
- Ensure that the belt is well-covered, e.g. with cardboard, before welding or grinding. Hot welding slag or grinding sparks can embed themselves in the surface of the belt.

8.8.   Welding of Transversal Struts and Contact Points

Check conveyor drawings and installation constructions:

Are there any designated welding spots on the conveyor or base frame in the range of the metal detector, which must be welded after installation of conveyor and base frame?

Mount these welding points!

Background: The measuring field of the metal detector indicates a very small electrical current (pA) in the metal parts of the conveyor. Slightest electrical changes on conveyor frame (for example: contact resistance at a bolted connection is being changed about 0,1 Ohm) can take effect to the measuring field and a metal alarm can be triggered. Only a welded connection insures in perpetuity a constant ohmic resistance.

⊖ **Caution!**
Always attach the grounding clamp of the welding unit directly next to the welding spot. Do not under any circumstances allow welding current to flow through the metal detector. This will lead to the destruction of the metal detector!
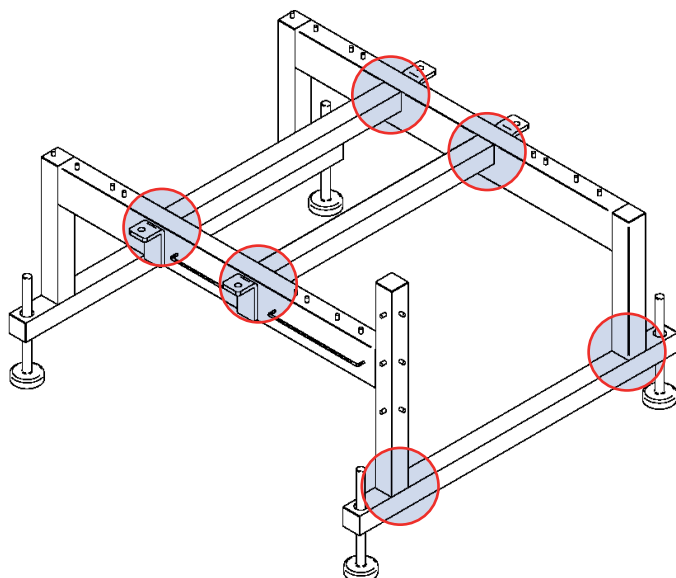
Weld transversal struts here (do not bolt)

8.9.   Isolation of Drums and Shafts

All drums and shafts have to be mounted one side isolated, for example using a plastic flange housing or plastic sleeve (refer to figure).
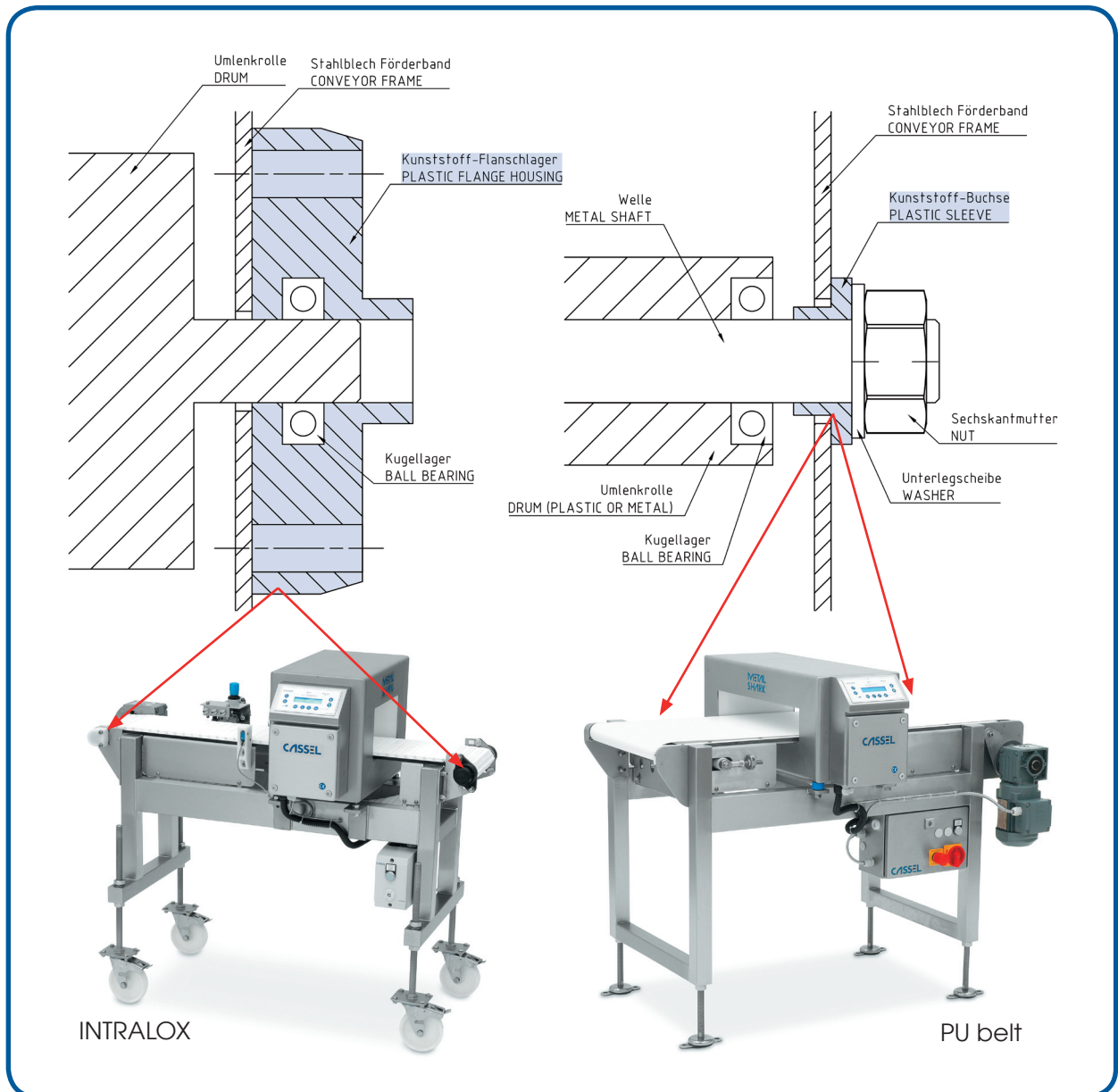
9. Electrical Installation

High Voltage!

Only qualified electricians are allowed to perform work inside of electrical cabinets.

High Voltage!

Hazard of electrical shock. Disconnect incoming power before opening the control box lid.

Use a metric Allen key 4 mm to unscrew the control box lid.
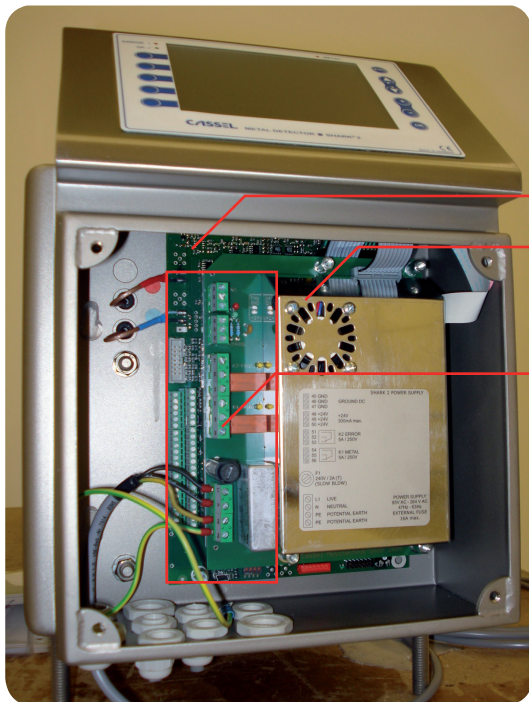
Mainboard

Power Supply Board
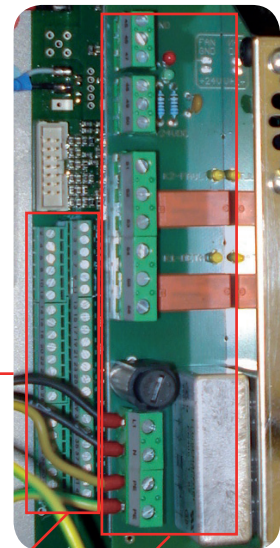
Terminals of the Mainboard

Terminals of the Power Supply Board

9.1. Terminals of Power Supply Board

Internal 0VDC	+24V DC	relay K2	relay K1	Fuse	AC 47-63Hz
45 - 47	48 - 50	51 - 53	54 - 56	1A T (slow)	L1 N PE PE
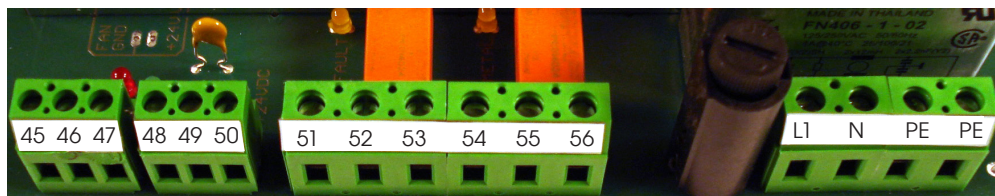
Terminal #	Function	Description	
45, 46, 47	Ground	Ground potential for internal power supply	
48, 49, 50	+ 24 V DC OUT	Internal Power supply source 24V/300mA max (total max. 400 mA accumulated at all 24V outputs; inclusive of mainboard outputs)	
Relay K2 51, 52, 53	Error alarm OUT	Closed line, potential free, switching capacity: 230V AC at 5 A max or 30V DC at 5A max	
Relay K1 54, 55, 56	Metal alarm OUT	Closed line, potential free, switching capacity: 230V AC at 5 A max or 30V DC at 5A max	
L1, N, PE	AC Power supply IN	Mains power supply 85 – 250 V AC / 47 – 63 Hz / 100 VA	

9.2. Relay K1, K2 - Function

Terminal #	Function	Relay Status				
		Power OFF	ERROR	NORMAL	METAL	
51 52 53	Relay K2 Error alarm OUT					
54 55 56	Relay K1 Metal alarm OUT					

9.3. Terminals on the Mainboard
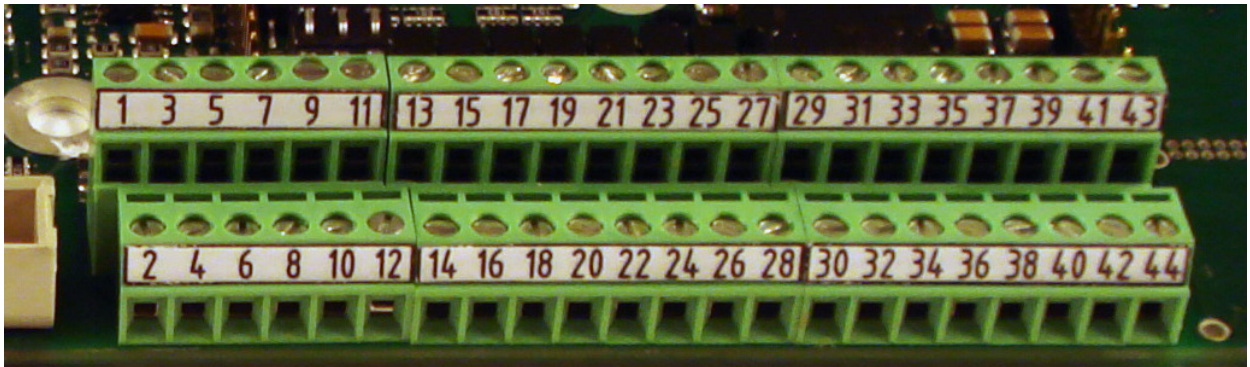
Termi-nal #	Name	Ratings	Function
1	AIN1	0-10V DC	Analogue input, application specific (when METAL SHARK® BIG pba = „Matt height, Board thickness, test stick diameter")
2, 4, 6, 8	AGND	0V Ana-logue	Analogue Ground
3	AIN2	0-10V DC	Analogue input, belt speed
5, 7	AOUT1, AOUT2	0-10V DC	Analogue output, application specific
9, 11, 13, 15, 17, 19, 21, 23	IN1 - IN8	24V DC, 10kΩ, 3mA	Logic input, functions refer to chapter *"13.2.5. IN/OUT MENU"* (Parameters E80 - E115)
10, 12, 14, 16, 18, 20, 22, 24	+24V	24V DC	+24V DC source for logic inputs (total max. 400 mA accumulated at all 24V outputs; inclusive of power supply board outputs)
25, 27, 29, 31, 33, 35, 37, 39	OUT1 - OUT8	24V DC,	Logic output, functions refer to chapter *"13.2.5. IN/OUT MENU"* (Parameters E120 - E155) (total max. 400 mA accumulated at all 24V outputs; inclusive of power supply board outputs)
26, 28, 30, 32, 34, 36, 38, 40	0V	0V DC	Logic ground for logic outputs
41	TX	-5...+5V digital	RS232 Asynchronous Serial-Data (transmitter) output.
42, 44	GND	0V DC	Ground for RS232
43	RX	-5...+5V digital	RS232 Asynchronous Serial-Data (receiver) input.

Caution!

The sum of all +24 VDC loads must not exceed 400mA, including all loads connected to mainboard (terminals 9 -40) and power supply board (terminals 48-50).

9.4. Wiring Diagram Examples

This chapter shows two typical METAL SHARK® 2 wiring examples with CASSEL conveyor belt controls. The specific wiring diagram for your metal detector is shipped along with the documentation.

9.4.1. Belt Controls STR1 and STL1
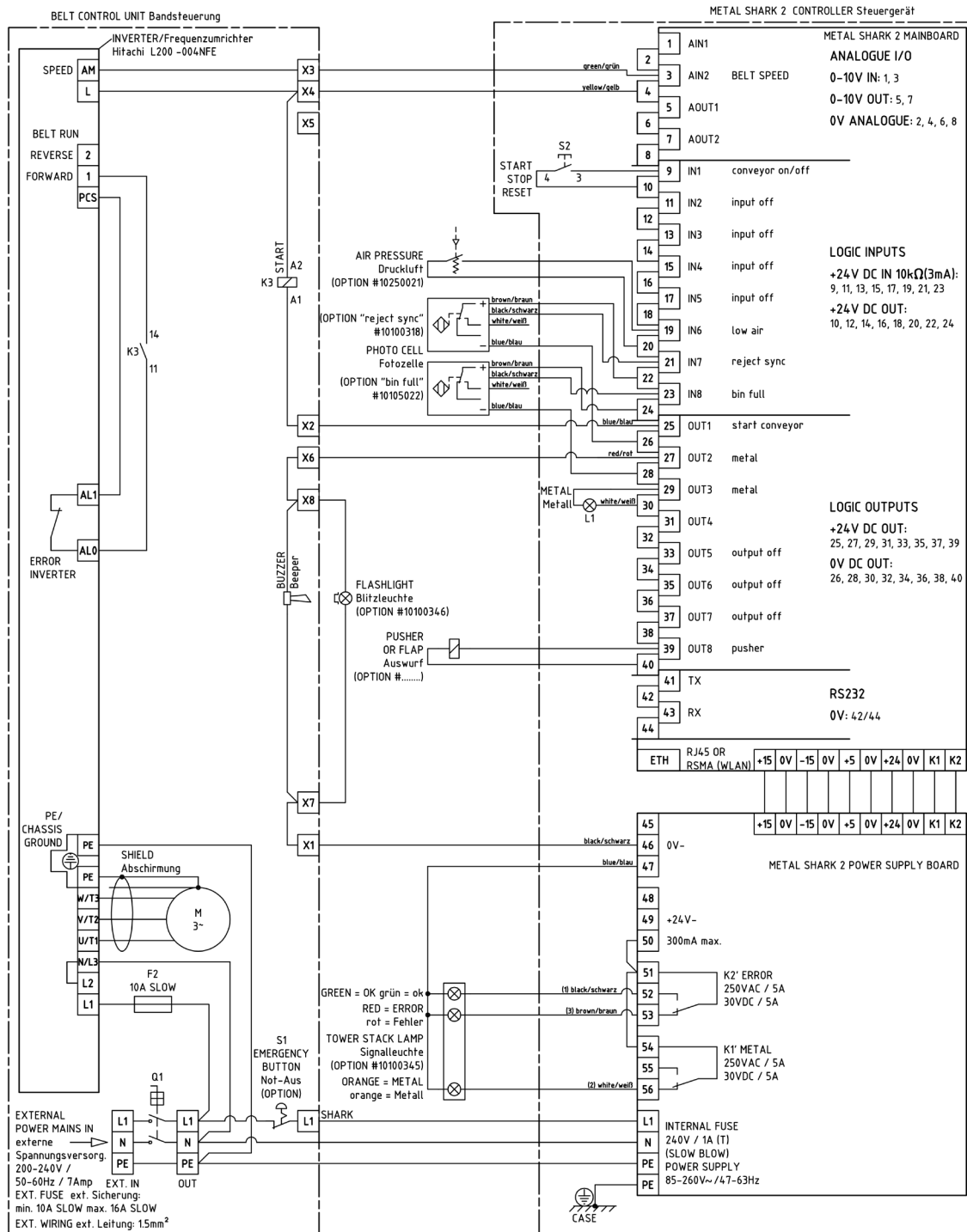
Caution!
The sum of all +24 VDC loads must not exceed 400mA, including all loads connected to mainboard (terminals 9 -40) and power supply board (terminals 48-50).

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9.4.2. Belt Controls STR2 and STL2

Caution!

The sum of all +24 VDC loads must not exceed 400mA, including all loads connected to mainboard (terminals 9 -40) and power supply board (terminals 48-50).

10. Control Panel and Main Screens

10.1. The Control Panel

This chapter describes the functions of the control panel's keys and LEDs.
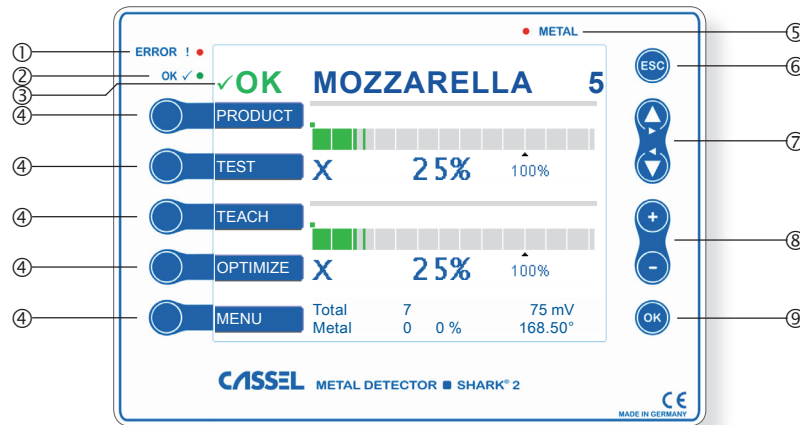
① **ERROR !** LED indicates a malfunction (more information: chapter *"13.1. Error Messages"*).

② **OK ✓** LED indicates that the metal detector is working properly.

③ **✓OK** is displayed when the metal detector is working properly.
STOP is displayed when the conveyor belt is stopped (only when using a conveyor belt)
!MET is displayed in case of a metal alarm.
!ERR is displayed in case of an error.

④ **Function Keys:** On the Main Screen the keys are preset to PRODUCT, TEST, TEACH, OPTIMIZE and MENU. In the menu you can assign shortcuts to the upper four keys by pressing the particular key for two seconds in the desired menu.

⑤ **METAL** LED indicates a metal alarm.

⑥ **ESC-Key:** Press ESC to leave the current menu item or data entry. Keep it pressed to return to the Main Screen.

⑦ **Arrow-Keys:** Press ▲▼ to choose the menu items and to change the Main Screen Mode (More information: chapter *"8.2. The Main Screens"*). When entering names and numbers you select the previous or next character with ◄►.

⑧ **Plus/Minus-Keys:** Press +/– to change parameters and to switch between functions.

⑨ **OK-Key:** Press OK to confirm a selection or entry.

10.2.   The Main Screens

The METAL SHARK® 2 has three graphic screen modes:

- 2D plot (teach area),
- bar graphs (histogram) and
- scope (oscilloscope)

Press ▲▼ on the main screen to change the screen mode.
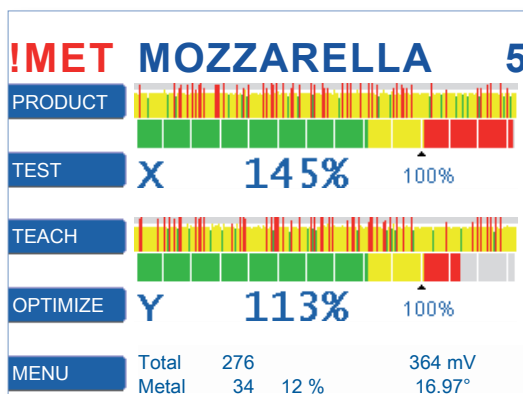
bar graphs (default)

We recommend to use the Bar Graph Screen for daily operation. It indicates how close the signals were to a metal alarm. Moreover, the histogram shows the signals of products and metal alerts that have occurred in the last hours.

For the different screen elements refer to *"8.2.1. The Bar Graph's Screen Elements"*.
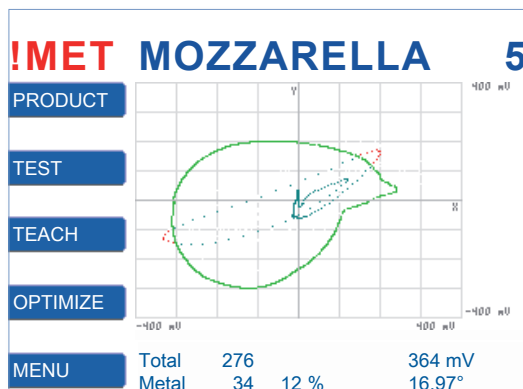
Press ▼

2D plot

We recommend the 2D Plot Screen to look for details of a single product sample.

For the different screen elements refer to *"8.2.2. The 2D Plot's Screen Elements"*.
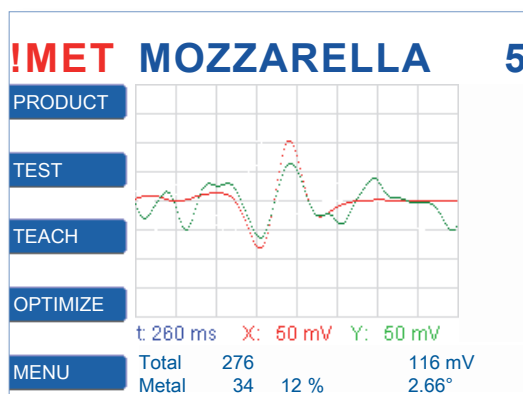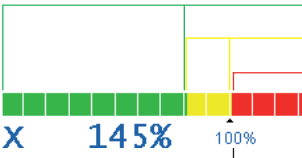
Press ▼

scope

We recommend that only technicians use the Scope Screen. It shows in detail the signal of short events.It scales automatically. However, when you press OPTIMIZE you can adjust the X-axis, Y-axis and time interval of one grid.

For the different screen elements refer to *"8.2.3. The Scope's Screen Elements"*.

10.2.1. The Bar Graph's Screen Elements
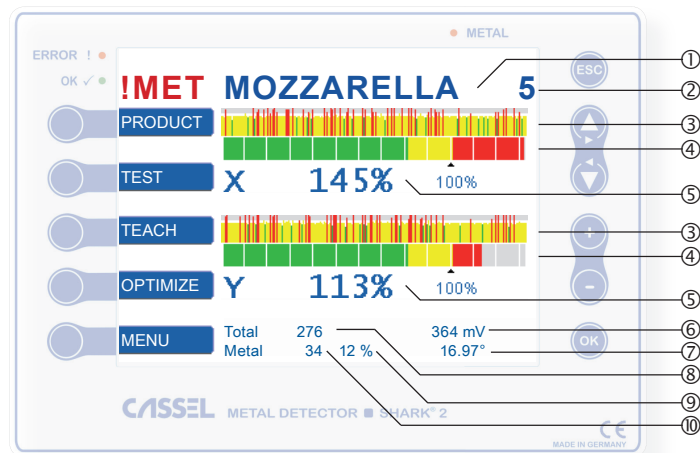
① **Name** of the currently chosen product.

② **Number** of the currently chosen product.

③ **Histogram** shows the last 232 signals and what they were about:
green = Good product in secure range (0 - 80%)
yellow = still good product, but almost identified as metal (80 - 100%)
red = metal alarm (>100%)

④ **Bar graph** shows the current signal amplitude as described below:

0 - 80 % = product signal
80 - 100 % = still good product, but almost identified as metal (80 - 100 %)
over 100 % = metal alarm
Metal threshold (always 100 %)

⑤ **Signal strengh in %** shows how close the signal comes to a metal alarm.

⑥ **Signal amplitude** shows the signal strenght in millivolts.

⑦ **Phase** shows the direction of the current signal.

⑧ Total shows the total number products. Only displayed if the conveyor is equipped with a photocell.

⑨ **Percent of products with metal**.

⑩ Metal shows the total number of metal alarms.

10.2.2.   The 2D Plot's Screen Elements
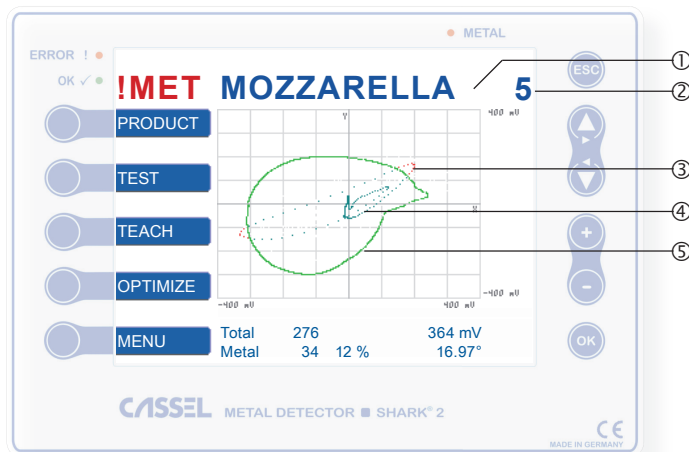
① **Name** of the currently chosen product.

② **Number** of the currently chosen product.

③ **Red dots** show measured values that left the teach area. Normally, this happens with contaminated products. In case the products are not contaminated you have to optimize.

④ **Product signal dots** show measured value of the product signal.

⑤ **Teach area** displays the tolerance range in which the signal is identified as product. All signals outside the teach area are identified as metal.

10.2.3.   The Scope's Screen Elements
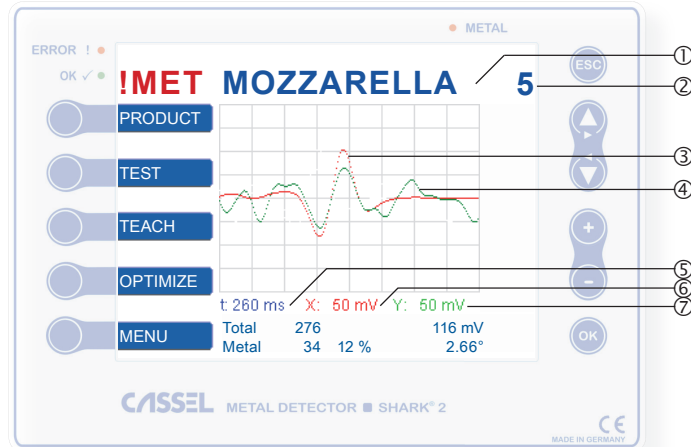
①   **Name** of the currently chosen product.

②   **Number** of the currently chosen product.

③   **Red dots** show signal amplitude of the X-channel.

④   **Green dots** show signal amplitude of the Y-channel.

⑤   **t:** shows the time interval of one grid square.

⑥   **X:** indicates the grid spacing of the X-channel in millivolt.

⑦   **Y:** indicates the grid spacing of the Y-channel in millivolt.

11. Initial Parameter Setup (all types, except BIG pba)

After the mechanical and electrical installation you have to set up a few parameters. The steps below help you to put the metal detector into first operation.

Note*: Step 3, Step 4 and Step 5 are not required if the metal detector is supplied as ready-system, e.g. with pipeline, reject device or conveyor. CASSEL factory sets these parameters for ready-systems.*

Switch power supply on
Set LANGUAGE.
Note*: For more information refer to chapter "13.2. SYSTEM MENU".*
Set SPEED mm/s.
Note*: For more information refer to chapter "13.2. SYSTEM MENU".*
Set IN/OUT MENU.
Note*: For more information refer to chapter "13.2.5. IN/OUT MENU".*
Set up REJECT MENU.
Note*: For more information refer to chapter "13.1.1. REJECT MENU".*
TEACH product.
Note*: For more information refer to chapter "11.3. TEACH - Add New Product".*

12. Daily Operation Overview
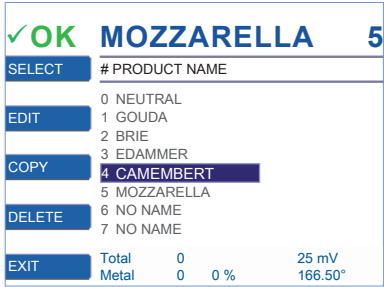
This chapter explains what steps you have to take in the daily operation of the metal detector.

Power on

Switch on the metal detector's power supply. After having auto-calibrated itself the METAL SHARK® 2 displays the main screen.

More information: *"8. Control Panel and Main Screens"*

OR

Select & Edit Products

Select existing product from product list: Press PRODUCT to open the product list. Press][to navigate through the product list and press SELECT to select the product.

More information: *"11.1. PRODUCT – Select and Edit Existing Products"*

Teach New Product

Press TEACH to add a new product to the product list. The teach assistant starts. Set up a new product. Press NEXT and feed product samples through the sensor.

More information: *"11.3. TEACH – Add New Product"*

Optimize Stability & Sensitivity

Best stability when X below 80% and Y below 80%.

Best sensitivity when X over 60% and Y over 60%. Press OPTIMIZE.

Stability = best, when below 80 %	Sensitivity = best, when over 60 %
If X-bar over 80% press TOL. X and +	If X-bar below 60% press TOL. X and -
If Y-bar over 80% press TOL. Y and +	If Y-bar below 60% press TOL. Y and -

More information: *"11.4. OPTIMIZE – Improve Stability & Sensitivity"*

Check Performance & Start Normal Production

Optionally, press TEST to test the metal detector's sensitivity. If an automatic test is set up, the test starts automatically.

Now start your normal production. Metal alarms are indicated on the screen: **!MET.**

More information: *"11.2. TEST – Check Metal Detector's Performance"* and *"12.2. TEST MENU"*

Print IFS/HACCP-Report

Optionally, you might want to print IFS/HACCP Reports or send them to a connected PC. Press MENU. Enter the REPORT MENU and open IFS/HACCP REPORT. Then press OK to print it.

More information: *"12.1. REPORT MENU"*

11.   Daily Operation

You always need these functions in the daily operation of the metal detector.

11.1.   PRODUCT – Select & Edit Existing Products

Step	Operation	Screen
1. Return to Main Screen	Press ESC to return to the main screen.	
2. Open product list	Press PRODUCT to open the product list. Press ▲▼ to navigate through the product list. The following functions are available:	✓OK MOZZARELLA 5 SELECT # PRODUCT NAME 0 NEUTRAL EDIT 1 GOUDA 2 BRIE 3 EDAMMER COPY 4 CAMEMBERT 5 MOZZARELLA DELETE 6 NO NAME 7 NO NAME EXIT Total 0 25 mV Metal 0 0 % 166.50°
	SELECT or OK — selects the product marked blue in the screen (in the example you would select CAMEMBERT).	
	EDIT — opens the PRODUCT MENU where you can edit the settings of the respective product. ("*12.4. PRODUCT MENU*")	
	COPY — copies the currently selected product, in the example MOZZARELLA, to the selected product memory, here CAMEMBERT. Confirm with OK.	
	DELETE — deletes the selected product memory, in the example CAMEMBERT. Confirm with OK.	

11.2. TEST – Check Metal Detector's Performance

Step	Operation	Screen
1. Return to Main Screen	Press ESC to return to the main screen.	
2. Start TEST	Press TEST to start the PVS Test (Performance Validation System Test). The screen prompts the required test stick size. The help text indicate whether you are to feed the test stick with or without a product sample. ESC aborts the test. **Note**: *Refer to chapter "12.2. TEST MENU" to set up the PVS Test (test stick sizes, etc.).*	Feed test balls with no product through sensor ✓OK MOZZARELLA 5 PVS TEST FE 0.7 mm Waiting X 79% 100% Y 78% 100% (Esc) (Ok) Total 11 28 mV MENU Metal 0 0 % 157.12°
3. Feed test sticks through sensor	Feed a test stick of the indicated size through the sensor. **Note**: *Do not feed products through the sensor.* The display shows:	Feed test balls with no product through sensor ✓OK MOZZARELLA 5 PVS TEST FE 0.7 mm Passed NFE 1.0 Passed SS 1.2 Waiting X 79% 100% Y 78% 100% (Esc) (Ok) Total 11 28 mV MENU Metal 0 0 % 157.12°
	Waiting — when it is waiting for the relative test stick.	
	Passed — when the correct test stick size has been detected.	
	Skipped — when you have set the size of the relative test stick to zero.	
	No Signal — when the time set for the parameter PVS WINDOW min is up and the metal detector has not detected a test stick.	
	Big Signal — when the signal of the test stick is bigger than the value set for max mV. After 10 seconds it switches back to Waiting and you can try again.	
	Repeat the test for every kind of metal configured in the TEST MENU to secure that the metal detector works properly.	
4. Test completed	As soon as the METAL SHARK® 2 has detected all test sticks the test is completed and the metal detector switches to normal mode. You can now continue with the normal production process. You can later check the test results in the IFS/HACCP REPORT ("*12.1.1. IFS/HACCP REPORT*")	Feed test balls with no product through sensor ✓OK MOZZARELLA 5 PVS TEST FE 0.7 mm Passed NFE 1.0 Passed SS 1.2 Passed ✓✓✓ X 79% 100% Y 78% 100% (Esc) (Ok) Total 11 28 mV MENU Metal 0 0 % 157.12°
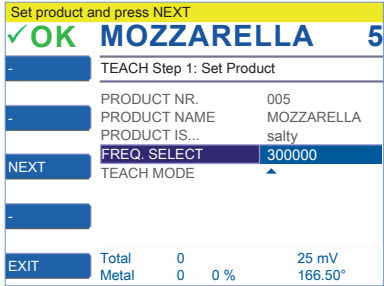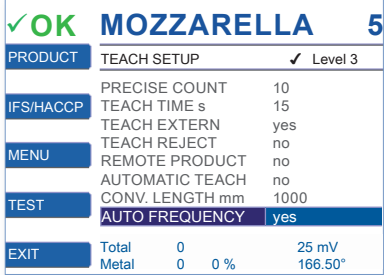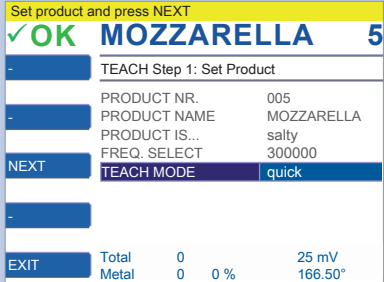
11.3.   TEACH – Add New Product

Step	Operation	Screen
1. Return to Main Screen	Press ESC to return to the main screen.	
2. Start teach assistant	Press TEACH to start the teach assistant. Use ▲▼ to navigate through the menu.	Set product and press NEXT ✓OK NO NAME 1 TEACH Step 1: Set Product PRODUCT NR. 001 PRODUCT NAME NO NAME PRODUCT IS... dry FREQ. SELECT 300000 NEXT TEACH MODE precise EXIT Total 0 25 mV Metal 0 0 % 166.50°
3. Choose PRODUCT NR.	Go to PRODUCT NR. (D005). Press +/- to choose the desired product number. Confirm with OK. *Note: Product 0 is set to neutral and can not be changed.*	Set product and press NEXT ✓OK NO NAME 1 TEACH Step 1: Set Product PRODUCT NR. 005 PRODUCT NAME PRODUCT IS... dry FREQ. SELECT 300000 NEXT TEACH MODE precise EXIT Total 0 25 mV Metal 0 0 % 166.50°
4. Choose PRODUCT NAME	Go to PRODUCT NAME (D010). Press OK to edit it. Press +/- to change the current letter. Press ◄ ► to select the previous/next letter. *Note: You can only use Latin characters.* Confirm the name with OK.	Set product and press NEXT ✓OK NO NAME 1 TEACH Step 1: Set Product PRODUCT NR. 005 PRODUCT NAME MOZZA PRODUCT IS... FREQ. SELECT 300000 NEXT TEACH MODE precise EXIT Total 0 25 mV Metal 0 0 % 166.50°
	Continued on next page	
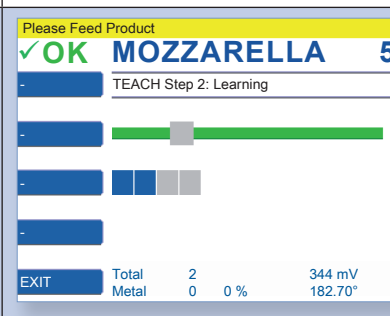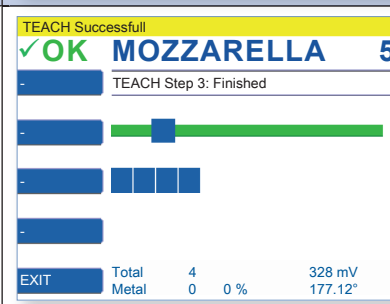
Step	Operation	Screen
5. Select product characteristics	Go to PRODUCT IS... (D015). Press OK. Press +/- to choose the characteristic that describes your product:	Set product and press NEXT ✓OK MOZZARELLA 5 TEACH Step 1: Set Product PRODUCT NR. 005 PRODUCT NAME MOZZARELLA PRODUCT IS... salty FREQ. SELECT 300000 TEACH MODE precise NEXT EXIT Total 0 25 mV Metal 0 0 % 166.50°

dry	Products with little residual moisture like powder and solid products
wet	Products with high amount of moisture, but few salt or spice content, e.g. sausages, meat, fruits, vegetables
salty	Products with high salt content and good conductivity, e.g. cheese
frozen	Deep frozen products (-18°C/0°F)
melting	Deep frozen products with lightly melted surface
alu foil	Products packaged in metalized film
plastic	Plastic granulate with graphite
vibration	Vibrations in the construction
shock	Hard knocks and shocks
optimize	All product tolerances are set to x1.0 by default
neutral	no product effect. Run the metal detector without TEACH. Set METAL SENSE mV (D120) only.

Confirm with OK.

Continued on next page

Step	Operation	Screen
6. Select frequency	Go to FREQ. SELECT (D020). Press OK. Press +/- to select the desired frequency. **Single-Frequency-Sensor:** This parameter cannot be changed. **Dual- or Four-Frequency-Sensor and** AUTO FREQUENCY (D115) **set to** yes: FREQ. SELECT is determined automatically. You cannot change it. **Dual- or Four-Frequency-Sensor and** AUTO FREQUENCY (D115) **set to** no: You can choose between the available sensor frequencies (only technicians). Confirm with OK.	Set product and press NEXT ✓OK **MOZZARELLA** 5 TEACH Step 1: Set Product PRODUCT NR. 005 PRODUCT NAME MOZZARELLA PRODUCT IS... salty FREQ. SELECT 300000 TEACH MODE ▲ NEXT EXIT Total 0 25 mV Metal 0 0 % 166.50° ✓OK **MOZZARELLA** 5 PRODUCT TEACH SETUP ✓ Level 3 PRECISE COUNT 10 IFS/HACCP TEACH TIME s 15 TEACH EXTERN yes TEACH REJECT no MENU REMOTE PRODUCT no AUTOMATIC TEACH no TEST CONV. LENGTH mm 1000 AUTO FREQUENCY yes EXIT Total 0 25 mV Metal 0 0 % 166.50°
7. Select TEACH MODE	Go to TEACH MODE (D025). Press OK. Press +/- to select quick or precise:	Set product and press NEXT ✓OK **MOZZARELLA** 5 TEACH Step 1: Set Product PRODUCT NR. 005 PRODUCT NAME MOZZARELLA PRODUCT IS... salty FREQ. SELECT 300000 NEXT TEACH MODE quick EXIT Total 0 25 mV Metal 0 0 % 166.50°
	quick: 3 to 7 product samples are necessary for the teach process. The product is taught with large tolerance but therefore faster. As a result, the metal detector does not detect with highest metal detection performance. We recommend to optimize the sensitivity afterwards using the OPTIMIZE-function.	
	precise: 8 to 14 product samples are necessary for the teach process. The result is that the metal detector is almost optimally adjusted to the product and, therefore, achieves very good results. In most cases you do not have to OPTIMIZE. Confirm with OK.	
8. Check settings and continue	Check your settings. Press NEXT to go to the next teach step.	
Continued on next page		

Step	Operation	Screen
9. Feed products through sensor	Feed product samples through the sensor. The number of products depends on what you have set up for TEACH MODE: quick 3 to 7 product samples precise 8 to 14 product samples	**Please Feed Product** ✓ OK **MOZZARELLA** 5 TEACH Step 2: Learning EXIT Total 2 344 mV Metal 0 0 % 182.70°
10. Teach successful	As soon as the METAL SHARK® 2 has collected all necessary data a help text confirms that the teach process has been successful. The product is now added to the product list and the metal detector is adjusted to the product.	**TEACH Successfull** ✓ OK **MOZZARELLA** 5 TEACH Step 3: Finished EXIT Total 4 328 mV Metal 0 0 % 177.12°

11.4. OPTIMIZE – Improve Stability & Sensitivity

Below two ways are described how to optimize the METAL SHARK® 2's sensitivity and stability. Typically, use OPTIMIZE after TEACH in case the result of the teach assistant is not satisfactory.

Note: *For products with* PRODUCT IS... *set to* neutral *refer to "11.4.3. Optimize with PRODUCT IS... set to neutral".*

11.4.1. Optimize with the Histogram

Step	Operation	Screen
1. Return to Main Screen	Press ESC to return to the main screen.	
2. Choose bar graph screen	Press ▲▼ until the bar graph screen is shown. **Note**: *For more information on the 2D plot refer to chapter "8.2.1. The Bar Graph Screen Elements".* The main screen example: Products frequently give out metal alarms (red lines). Many products are only within the tolerance range (yellow lines). Press OPTIMIZE if these products are not contaminated.	!MET **MOZZARELLA** 5 PRODUCT TEST X **145%** 100% TEACH OPTIMIZE Y **113%** 100% MENU Total 276 578 mV Metal 34 12 % 2.37°
3. Set TOL. X and/or TOL. Y	The yellow help text shows that you should change TOL. X and TOL. Y. A value between 60 and 80% is the optimal setting for best sensitivity at highest stability. Press TOL. X or TOL. Y. Press +/- to increase/decrease the value. Confirm with OK. In the example we increase TOL. X and TOL. Y from 1.2 to 1.3. **Note**: *For more information on tolerances refer to "13.1.3. ADVANCED (MENU)"*	Set TOL. X to make X max. 80% !MET **MOZZARELLA** 5 TOL. X 1.2 TOL. Y 1.2 X **145%** 100% - - Y **113%** 100% EXIT Total 276 578 mV Metal 34 12 % 2.37°
4. Check result and adjust	Due to increasing the tolerance the products are not identified as metal anymore. The histogram of the X-value show, however, that the majority of the signals are still within the tolerance range between 80 and 100%. Consequently, "irregular products" may cause metal alarms. Therefore, increase TOL. X, in this example to 1.4.	Set TOL. Y to make Y max. 80% ✓OK **MOZZARELLA** 5 TOL. X 1.3 TOL. Y 1.3 X **87%** 100% - - Y **78%** 100% EXIT Total 623 566 mV Metal 38 6 % 2.44°

Step	Operation	Screen
5. Check result and adjust	Due to increasing TOL. X all signals are in the range below 80%. All histograms are now green. Irregular products do not cause metal alarms. They are within the tolerance range. The metal detector is now set up optimally. Only contaminated products cause metal alarms.	Set TOL. X to make X max. 80% ✓OK **MOZZARELLA** 5 TOL. X 1.4 TOL. Y 1.3 X 79% 100% - - Y 78% 100% EXIT Total 907 575 mV Metal 38 4% 1.66°

11.4.2.   Optimize with the 2D Plot
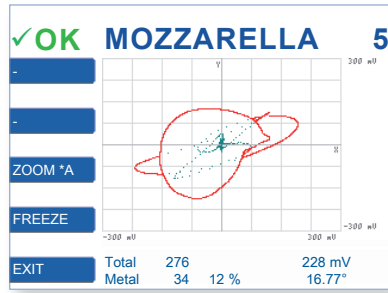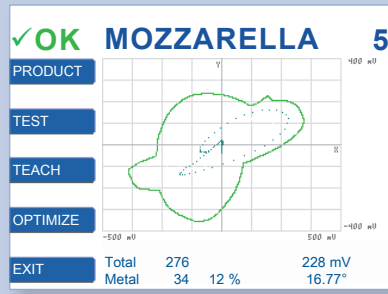
= product effect

= tolerance range

= teach area

= PRODUCT Y TOL.

Step	Operation	Screen
1. Return to Main Screen	Press ESC to return to the main screen.	
2. Choose 2D plot screen and press OPTIMIZE	Press ▲▼ until the 2D plot screen is shown. *Note: For more information on the 2D plot refer to chapter "8.2.2. The 2D Plot's Screen Elements".* In the example an irregular product causes a wrong metal alarm (!MET). Press OPTIMIZE to optimize the teach-area (inside of the green line).	

Step	Operation		Screen
3. Increase tolerance or press FREEZE	Now you have two options: Either you increase the tolerance (as described in the previous chapter) or you can press FREEZE which gives you the following options:		
	Simple Freeze	Records product signals over a longer period of time. This way you see how good the teach area describes the product. For more Information refer to "*11.4.2.1. Simple Freeze*".	
	Add to Teach Area	Adds the signals of irregular products to the teach area. For more Information refer to "*11.4.2.2. Add to Teach Area*".	
	New Teach Area	Deletes the old teach area. The products you feed through the sensor create the new teach area. The settings are the same as the original TEACH. For more Information refer to "*11.4.2.3. New Teach Area*".	
	ZOOM lets you zoom in and out.		
	*A	zooms automatically	
	*1 - *40	zooms 1 to 40-fold	

11.4.2.1 Optimize with the 2D Plot – Simple Freeze
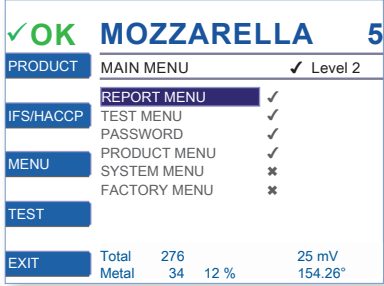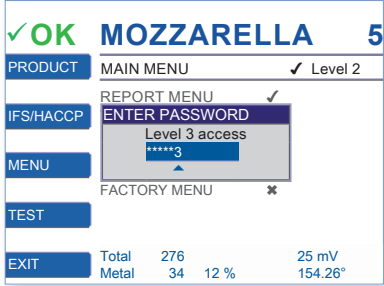
Step	Operation	Screen
1. Start Simple Freeze	Press OK to start Simple Freeze Mode. **Note**: Please read chapter "11.4.2. Optimizing with the Teach Area" first. Simple Freeze displays all product signals since you have started Simple Freeze. It shows how optimally the metal detector is adjusted to your product.	
2. Increase/decrease tolerance	In the example the turquoise dots mark the product signals that were recorded. The red circle is the teach area. The white area between the turquoise dots and the teach area is the tolerance range. During Simple Freeze Mode metal detection is enabled. Product signals that exceed the teach area are marked red and cause metal alarms. To increase the metal detection performance and to detect smaller metal contaminants you decrease the tolerance. **Note**: If too many irregular products are rejected, as described in 11.4.1, increase the tolerance.	✓OK **BRIE** 5 TOL. X 2.0 TOL. Y 2.0 ZOOM *A FREEZE 00:00:46 EXIT Total 276 234 mV Metal 34 12 % 182.66°
3. Decrease tolerance	Press TOL. X or TOL. Y Press +/- to make the area smaller/bigger. Confirm with OK. **Note**: Increase / decrease TOL. X and TOL. Y in small steps (0.1). In the example you see that the teach area wraps itself around the product signals more tightly. The grey lines show the teach area before decreasing the tolerances.	✓OK **BRIE** 5 TOL. X 1.8 TOL. Y 1.8 ZOOM *A FREEZE 00:01:25 EXIT Total 276 234 mV Metal 34 12 % 182.66°
4. Confirm	Decrease the tolerance until the teach area wraps itself perfectly around the product signals. **Note**: Keep in mind that the less tolerance range you leave the more often irregular products might cause false metal alarms. Press FREEZE again to stop the Simple Freeze Mode.	✓OK **BRIE** 5 TOL. X 1.5 TOL. Y 1.8 ZOOM *A FREEZE 00:02:44 EXIT Total 276 234 mV Metal 34 12 % 182.66°

11.4.2.2 Optimize with the 2D Plot – Add to Teach Area

Step	Operation	Screen
1. Start Add to Teach Area	This mode lets you modify and extend an existing teach area. Press + to start Add to Teach Area Mode. **Note**: Please read "11.4.2. Optimizing with the Teach Area" first.	
2. Feed irregular products	Now add the signals of irregular products to the teach area by feeding these irregular products through the sensor. In the example you see that the original teach area is extended by the measured signals. **Note**: Metal is not detected during this process. Therefore, FREEZE ends automatically after three minutes.	✓OK **MOZZARELLA** 5 ZOOM *A FREEZE EXIT Total 276 228 mV Metal 34 12 % 16.77°
3. Confirm result	Press FREEZE. Press: • OK to save the new teach area / stop FREEZE, • + to collect more irregular product signals or • ESC to quit and keep the old teach area. In the example you see that products that would be rejected are now within the teach area and thus in the desired range. They are not rejected anymore. Repeat this process if other irregular products cause metal alarms.	✓OK **MOZZARELLA** 5 PRODUCT TEST TEACH OPTIMIZE EXIT Total 276 228 mV Metal 34 12 % 16.77°

12. MENU – Daily Operation Setup

Preset and automize the functions for the daily operation of the metal detector.

Step	Operation	Screen
1. Return to Main Screen	Press ESC to return to the main screen.	
2. Open Menu	Press MENU to open the menu. Navigate through the menu and submenus with ▲▼. Open the respective menu with OK. Press ESC at any time to abort your current operation ✓ — Marks menus that you are allowed to enter. ✘ — Marks menus that only users of a higher password level are allowed to enter. When you press OK, however, you are prompted to type in the correct password. Refer to chapter "*12.3. PASSWORD (MENU)*" for more information. In case you do not have the necessary rights to enter the specific menu you are prompted to enter the specific password (refer to illustration). If you want to change passwords refer to chapter "*12.3. PASSWORD (MENU)*".	✓OK **MOZZARELLA** 5 PRODUCT · MAIN MENU · ✓ Level 2 IFS/HACCP · REPORT MENU ✓ · TEST MENU ✓ · PASSWORD ✓ · PRODUCT MENU ✓ · SYSTEM MENU ✘ · FACTORY MENU ✘ MENU TEST EXIT · Total 276 · 25 mV · Metal 34 · 12 % · 154.26° ✓OK **MOZZARELLA** 5 PRODUCT · MAIN MENU · ✓ Level 2 IFS/HACCP · REPORT MENU ✓ · ENTER PASSWORD · Level 3 access · *****3 ▲ · FACTORY MENU ✘ MENU TEST EXIT · Total 276 · 25 mV · Metal 34 · 12 % · 154.26°

12.1. REPORT MENU

✓OK **MOZZARELLA** 5
PRODUCT · REPORT MENU · ✓ Level 2
IFS/HACCP · IFS/HACCP REPORT · METAL REPORT · EVENT REPORT · METAL COUNTER 34 · TOTAL COUNTER 276
MENU · PRINT one by one · INTERFACE RS232
TEST · BAUDRATE RS232 115200
EXIT · Total 276 · 25 mV · Metal 34 · 12 % · 154.26°

Use the REPORT MENU to monitor the production and to automize data logging.

12.1.1.   IFS/HACCP REPORT

The IFS/HACCP REPORT (A005) shows detailed information about the production. It consist of three parts that are described below: SUMMARY, METAL, EVENTS.

You can switch between the different types with +/-.

With ▲▼ you can scroll up and down.

Press ESC to return to the main menu.

Press OK to print the IFS/HACCP REPORT.

Note: Set the parameter PRINT to report to set up a printer connected to the RS232 inter-face. More information "11.1.6. PRINT".

The SUMMARY shows the following information:

From date/time:	Indicates when the last report was printed.
To date/time:	Indicates the current time and date.
Number of passed PVS tests:	Indicates the number of PVS test that were completed accordingly.
Number of failed PVS tests:	Indicates the number of PVS test that were not completed accordingly.
Metal Events:	Indicates the number of metal events that have occurred since the last report was printed.
Product Counter:	Indicates the number of products that have gone through the sensor since the last report was printed.
Percent Metal:	Indicates the ratio (%) of contaminated products to the total number of products.

METAL shows detailed information about the specific metal events. Here an example of how to read the list:

0034	number of the metal alarm.
2008-05-05	date the alarm occurred.
17:22:24	time the alarm occurred.
P005	product number.
245 mV	voltage that was measured.
132.88°	phase that was measured.

EVENTS shows all events since the last print out (max last 1024 events). Here an example of how to read the list:

0001	number of the event.
2008-05-05	date of the event.
17:22:24	time of the event.
[01]	code for the respective type of event.
System started	Indicates which parameter was changed or what action was taken.

12.1.2. METAL REPORT

METAL REPORT (A010) shows the same information like the IFS/HACCP REPORT - METAL plus two additional information. Press + to display these.

With ▲▼ you can scroll up and down.

Press ESC to return to the main menu.

Press OK to print the METAL REPORT.

> **Note**: Set the parameter PRINT to report to set up a printer connected to the RS232 interface. More information "11.1.6. PRINT".

```
✓OK  MOZZARELLA       5
METAL REPORT
0034 P005 245 mV 132.88° 600000 Hz 12%/800%
0033 P005 225 mV 164.74° 600000 Hz 12%/800%
0032 P005 211 mV 126.36° 600000 Hz 12%/800%
0031 P005 214 mV 175.56° 600000 Hz 12%/800%
0030 P005 227 mV 153.98° 600000 Hz 12%/800%
0029 P005 275 mV 144.54° 600000 Hz 12%/800%
0028 P005 264 mV 186.76° 600000 Hz 12%/800%
0027 P005 199 mV 116.92° 600000 Hz 12%/800%
0026 P005 278 mV 175.53° 600000 Hz 12%/800%

EXIT      Total    276            25 mV
          Metal     34   12 %    154.26°
```

The two additional pieces of information are:

600000 Hz	Sensor frequency for this product.
12%/800%	amplification of X and Y for this product.

12.1.3. EVENT REPORT

EVENT REPORT (A015) shows the same information like the IFS/HACCP REPORT - EVENTS. However, the data is not deleted at any time. The last 1024 events are always listed. For more information refer to "*12.1.1. IFS/HACCP REPORT*".

With ▲▼ you can scroll up and down.

Press ESC to return to the main menu.

Press OK to print the EVENT REPORT.

> **Note**: Set the parameter PRINT to report to set up a printer connected to the RS232 interface. More information "11.1.6. PRINT".

12.1.4. METAL COUNTER

METAL COUNTER (A020) shows how many products have been contaminated.

Press OK and then + and - simultaneously to reset the counter to zero.

12.1.5. TOTAL COUNTER

TOTAL COUNTER (A025): In case you have a conveyor belt with a photo cell the number of products is counted and displayed here.

Press OK and then + and - simultaneously to reset the counter to zero.

12.1.6. PRINT

```
✓OK   MOZZARELLA    5
PRODUCT   REPORT MENU        ✓ Level 2

IFS/HACCP    IFS/HACCP REPORT
             METAL REPORT
             EVENT REPORT
MENU         METAL COUNTER      34
             TOTAL COUNTER      276
             PRINT          one by one
TEST         INTERFACE        RS232
             BAUDRATE RS232   115200

EXIT         Total    276          25 mV
             Metal    34    12 %    154.26°
```
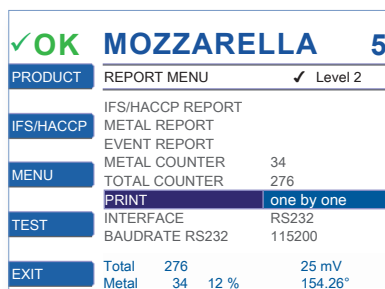
Default: off

PRINT (A030): Protocol mode of optional printer.

> **Note**: Refer to "12.2.5. IN/OUT MENU" and "7.3. Terminals on the Mainboard" to connect a printer to the METAL SHARK® 2.

off	No output to interface
report	You can print various reports by pressing OK in the report screens.
one by one	Each metal alert and event immediately makes the printer print a message.
SharkDiag	for SHARK DIAGNOSE® software at Windows PC
SharkNet	for SHARKNET® software at Windows PC

12.1.7. INTERFACE

INTERFACE (A035) sets the output for the data. Options are:

RS232	Sends data via RS232
Ethernet	Sends data via optional Ethernet or WLAN to PC

Default: RS232

12.1.8. BAUDRATE RS232

BAUDRATE RS232 (A040) sets the speed of the RS232 interface.

Default: 9600

12.1.9. SHARKNET UNIT

SHARKNET UNIT # (A045) sets the address of the controller when it is part of a SHARKNET®.

Default: 1

12.1.10. MAIN SCREEN

MAIN SCREEN (A050) sets which screen is displayed after you switch on the METAL SHARK® 2. Options are: 2D plot (teach area), bar graphs (histogram), scope (oscilloscope).

Default: bar graphs

12.1.11. HISTOGRAM LIMIT %

HISTOGRAM LIMIT % (A055) sets a threshold. Only signals that exceed this threshold are displayed in the histogram.

Default: 20

12.1.12. INFO SOFTWARE

INFO SOFTWARE (A060) shows the current software version installed on the METAL SHARK® 2.

12.2. TEST MENU

✓OK MOZZARELLA 5

PRODUCT	TEST MENU	✓ Level 2
	AUTO PVS TEST	yes
IFS/HACCP	PVS FE mm	0.7
	PVS FE max %	1000
	PVS NonFE mm	1.0
MENU	PVS NonFE max %	1000
	PVS SS mm	1.2
TEST	PVS SS max %	1000
	PVS FREQ hrs	8
EXIT	Total 276	25 mV
	Metal 34 12 %	154.26°
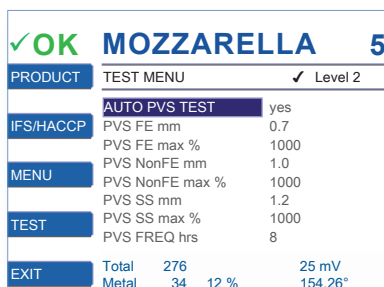
Use the TEST MENU to adjust the settings of the PVS test, explained in "*10.2. TEST – Check Metal Detector's Perform-ance*".

Note: *After changing a parameter you are prompted to choose whether you want to change all products or the currently chosen one. Press* + *and* - *simultaneously to change all products or* OK *to change the currently chosen one.*

AUTO PVS TEST (B005)	sets up an automatic reminder reminding you to check the performance of the metal detector. **Default**: no
PVS FE mm (B010) PVS NonFE mm (B020) PVS SS mm (B030)	set the test stick size of the respective metal that is to be found. **Note**: *If you do not want to test a certain metal set the relative parameter to zero.* **Default**: depends on application Range: 0 - 99.9 [Millimetres]
PVS FE max % (B015) PVS NonFE max % (B025) PVS SS max % (B035)	set the percentage that is not to be exceeded during the test. If it is exceeded an alarm is given out. **Note**: *If you do not want to test a certain metal set the relative parameter to zero.* **Default**: depends on application Range: 0 - 9999
PVS FREQ hrs (B040)	sets every how many hours a test is to occur if AUTO PVS TEST is set to yes. **Default**: 24 Range: 1 - 500
PVS WINDOW min (B045)	Time frame for testing after PVS appeared. **Default**: 30 Range: 1 - 180
PVS ERROR COUNT (B050)	sets how often you can skip or fail the PVS Test before the error message PVS Test Elapsed is displayed. **Default**: 3 Range: 1 - 999
PVS COUNT METAL (B055)	If set to no the metal counter does not increase when detecting a test stick. **Default**: no
PVS USE PRODUCT (B060)	If set to no the user is promted to feed the test stick without a product sample. **Default**: no

12.3. PASSWORD (MENU)
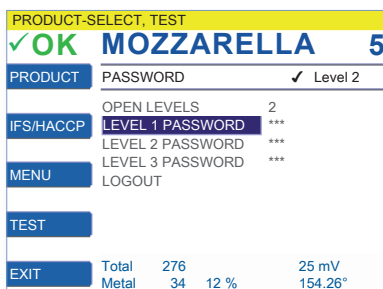
Level 1: e.g. for operators
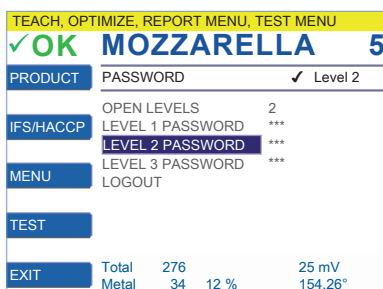
Level 2: e.g. for
production manager
and quality manger
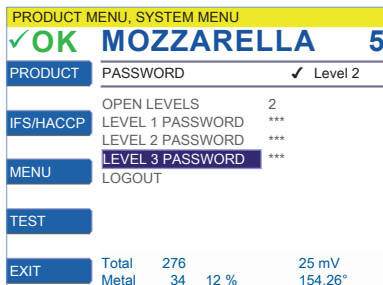
Level 3: e.g. for
company technician

Use the PASSWORD (MENU) to set the specific passwords and grant operators different rights. This way you ensure that only qualified personnel has access to key functions.

Below the various parameters are explained:

OPEN LEVELS (C005)	Sets which password levels are open without having to enter a specific password.
LEVEL 1 PASSWORD (C010)	Sets the password for level 1 users, e.g. production line operators. Level 1 users are allowed to SELECT products and TEST the metal detector's functionality. **Default**: CM0001
LEVEL 2 PASSWORD (C015)	Sets the password for level 2 users, e.g. production or quality managers. Level 2 users are allowed to TEACH and OPTIMIZE products, print reports and set up TEST. **Default**: CM0002
LEVEL 3 PASSWORD (C020)	Sets the password for level 3 users, e.g. company technicians. Level 3 users are allowed to access and alter settings in the PRODUCT MENU and SYSTEM MENU. **Default**: CM0003
LOGOUT (C025)	Locks all password levels that are higher than the level set for the parameter OPEN LEVELS. Use this function when you are done with your settings and you want to prevent others from changing any settings.

12.4. PRODUCT MENU

✓OK	**MOZZARELLA**	5
PRODUCT	PRODUCT MENU	✓ Level 2

PRODUCT NR.	005
PRODUCT NAME	MOZZARELLA
PRODUCT IS...	salty
FREQ. SELECT	300000
TEACH MODE	precise
REJECT MENU	✖
TEACH SETUP	✖
ADVANCED	✖

Total	276		25 mV
Metal	34	12 %	154.26°

Use the PRODUCT MENU to preset all products with the same settings or if you want to change settings of an existing product.

Refer to *"10.3. TEACH - Teach New Products"* for more information on the parameters.

> **Note**: *After changing a parameter you are prompted to choose whether you want to change all products or the currently chosen one. Press + and - simultaneously to change all products or* OK *to change the currently chosen one.*

Only level 3 users can access the REJECT MENU, TEACH SETUP and ADVANCED. They are explained in detail in the next chapter.

13. MENU – General Settings

These settings adapt the METAL SHARK® 2 controller to hardware like pusher, conveyor, sensor head etc.

13.1. PRODUCT MENU

13.1.1. REJECT MENU

✓OK **MOZZARELLA** 5	
PRODUCT	REJECT MENU ✓ Level 3
	DELAY mm 0
IFS/HACCP	DURATION ms 500
	METAL CONTACT pulse
	PUSHER TOL mm 100
MENU	METAL-PHOTO mm 0
	BELT STOP PUSH yes
TEST	
EXIT	Total 276 25 mV
	Metal 34 12 % 154.26°

The REJECT MENU sets up the timing for reject devices and photo cell triggering.

DELAY mm **(D035)**	Delays the metal output signal for a certain distance. Use this to setup the proper reject timing. The metal detector calculates a time delay based on DELAY mm and SPEED mm/s. *Note: During the delay period other metal signals which occur are stored in a shift register and are not lost.* **Default**: 0 [Millimetres] **Range**: 0 - 30,000 [Millimetres]
DURATION ms **(D040)**	is the length of time in milliseconds for which the Metal signal relay remains switched. Sets the length of a metal output pulse signal. E.g. use this to setup how long a reject signal remains active. *Note: Whilst the relay is switched on, other metal signals which occur are stored in a shift register and are not lost.* **Default**: 500 [Milliseconds] Range: 150 - 30,000 [Milliseconds]

		programs the function of the metal alarm outputs.
METAL CONTACT (D045)	pulse	Metal alarm as a pulse with the duration DURATION ms. Use e.g. when pneumatic nozzles separate the metal
	gf1	Drives reject flaps with gravity feed applications. Error = flap in reject - position
	gf2	Drives reject flaps with gravity feed applications. Error = flap in ok - position
	mesep	Metal separator model MESEP® SE
	inline	Security drive of inline reject EX-PWC
	hold	Standard value for belt stop with reset push button.
	push1	Pusher with photo cell active 0V (synchronized reject signal).
	push2	Pusher with photo cell active 24V (synchronized reject signal).
	push3	Pusher without photo cell synchronization
	Default: pulse	
PUSHER TOL mm (D050)	Tolerance for photo eye trigger. Preset by CASSEL. **Default**: 30 [Millimetres] Range: 0 - 999 [Millimetres]	
METAL-PHOTO mm (D055)	sets the distance between metal detection and photo cell. **Default**: depends on application Range: 0 - 200 [Millimetres]	
BELT STOP PUSH (D060)	yes: The conveyor stops when the pusher is activated. **Default**: depends on application	

13.1.2.   TEACH SETUP

In the TEACH SETUP you adjust the settings for the teach assistant. For more information refer to chapter *"11.3. TEACH - Add New Product"*.

SENSE MIN mV (D065)	Defines the smallest possible sensitivity that the teach assistant can automatically set. For most cases setup according suggestion of yellow help line. ***Note**: Use product 0 when setting up this parameter* **Range**: 3 - 2,000
TEACH SENSE mV (D070)	blanks out signals that are smaller than this value. TEACH SENSE mV prevents the metal detector from recognizing e.g. noises as products. It should be at least the value of SENSE MIN mV. Signals that are bigger are identified as products. Set this parameter as the yellow help text indicates. **Range**: 3 - 2,000
QUICK COUNT (D075)	defines the maximum number of product samples required for TEACH STEP 2 if TEACH MODE is set to quick. **Default**: 3
PRECISE COUNT (D080)	defines the maximum number of product samples required for TEACH STEP 2 if TEACH MODE is set to precise. **Default**: 7
TEACH TIME s (D085)	The teach assistant stops after TEACH TIME s is elapsed. You have to feed at least one product sample during that time. In case you do not feed a product the teach assistant stops and sets the highest possible sensitivity. **VERY IMPORTANT**: TEACH TIME s must be high enough to get at least one product signal. Otherwise the compensation fails! Recommendations: Product speed 100-200 mm/sec. → TEACH TIME s = 45 Product speed 200-300 mm/sec. → TEACH TIME s = 30 Product speed 300-500 mm/sec. → TEACH TIME s = 20 Product speed above 500 mm/sec. → TEACH TIME s = 15 **Default**: depends on application Range: 2 - 300 [Seconds]
TEACH EXTERN (D090)	yes: teach assistant starts when a 24V PLC signal is provided to the appropriate input. **Default**: no
TEACH REJECT (D095)	yes: activates metal alarm during teach assistant. **Default**: no

REMOTE PRODUCT (D100)	**yes**: sets PRODUCT 0 – 20 remotely according input voltage 0-10V at terminal AIN1..
	Note: *Refer to Service Manual for detailed information.*
	Note: Available only for conveyors supplied by CASSEL
	Default: no
AUTOMATIC TEACH (D105)	**yes**: only one product sample is required for the teach process. The conveyor belt goes back and forth feeding the product through the sensor automatically.
	Note: *Make sure that* CONV. LENGTH mm *is set up correctly.*
	Default: no
CONV. LENGTH mm (D110)	sets the length of the conveyor belt for AUTOMATIC TEACH.
	Default: 1,000 [Millimetres], should be set to actual value
	Range: 100 - 9,999 [Millimetres]
AUTO FREQUENCY (D115)	**yes**: In case of a two or four frequency sensor head the teach assistant chooses automatically the best frequency automatically.
	Default: no
TEACH PHOTO mm (D117)	sets the distance from photo cell to sensor end.
	Default: 999 [Millimetres], should be set to actual value
	Range: 0 - 999 [Millimetres]

13.1.3. ADVANCED (MENU)
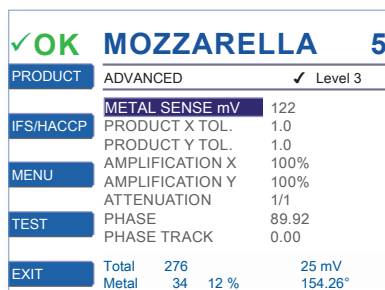
The ADVANCED (MENU) is for experts only. Product parameters are automatically set during the teach assistant. This menu allows to modify the product parameters manually.

METAL SENSE mV (D120)	sets the metal sensitivity and thus the threshold for metal detection. If set to 3000 mV metal detection for this product is deactivated and NOT ACTIVE is displayed.
	To determine which mV a particular metal object generates, refer to mV value in the lower right corner of the display. Bear in mind that non-spherical metal parts may generate different magnitudes depending on their orientation. Magnetic metal parts produce a larger signal than non-magnetic metal parts.
	Note: *Normally, you only have to set* METAL SENSE mV *for neutral products (*PRODUCT IS... = neutral*). The teach assistant presets* METAL SENSE mV *for all other products automatically.*
	Default: set during TEACH
	Range: 3 - 3,000

PRODUCT X TOL. (D125)	adds a tolerance range around the product effect. The tolerance range prevents false alarms from irregular products. Increasing PRODUCT X TOL. increases the teach area at the X-axis. PRODUCT X TOL. is automatically added as a factor to the result of the teach assistant. It is not altered by the teach assistant. Thus, it allows to preset a larger tolerance range than the teach assistant automatically considers. **Default**: 1.0 Range: 0.0 - 9.9
PRODUCT Y TOL. (D130)	adds a tolerance range around the product effect. The tolerance range prevents false alarms from irregular products. Increasing PRODUCT Y TOL. increases the teach area at the Y-axis. PRODUCT Y TOL. is automatically added as a factor to the result of the teach assistant. It is not altered by the teach assistant. Thus, it allows to preset a larger tolerance range than the teach assistant automatically considers. **Default**: 1.0 Range: 0.0 - 9.9
AMPLIFICATION X (D135)	Hardware amplification factor for the product effect (X channel). The larger the product effect is, the smaller the AMPLIFICATION X value has to be. 3% is the smallest hardware amplification. **When using product memories 1 - 120**: AMPLIFICATION X is set automatically during teach process according to the following rule: Very strong product effect amplitude = AMPLIFICATION X 3% Low product effect amplitude = AMPLIFICATION X 200% **Default**: set during teach process Values: 3%, 6%, 12%, 25%, 50%, 100% and 200%
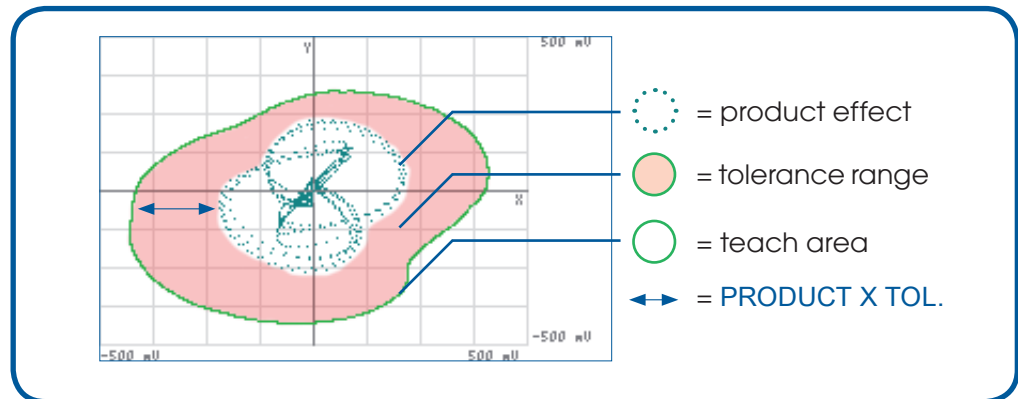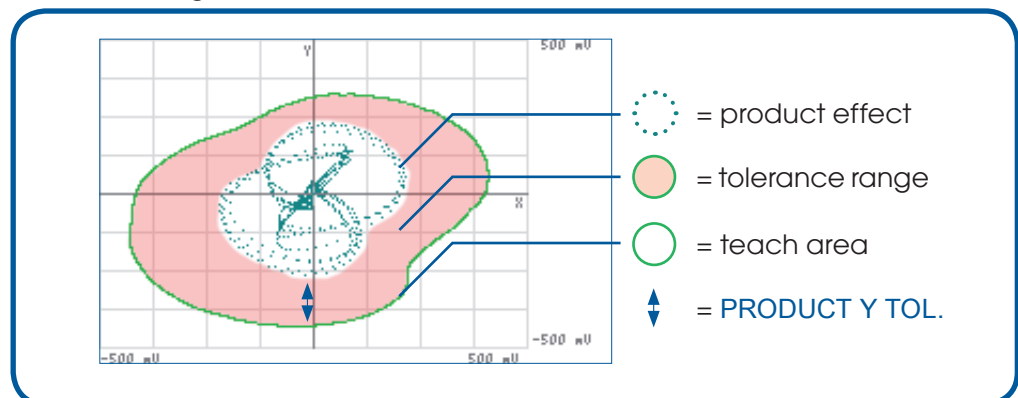
AMPLIFICATION Y (D140)	Refer to AMPLIFICATION X.
ATTENUATION (D145)	attenuates the signal received from the sensor head. **Default**: 1/1 Values: 1/1, 1/3, 1/10
PHASE (D150)	The setting of the product phase helps to blank out any product effect. It is set automatically during the TEACH process. **Note**: PHASE *is only available with product 1 - 120, not with PRODUCT 000.* **Default**: 0.00°
PHASE TRACK (D155)	adjusts the product's phase during normal operation to compensate slow changes of the product effect phase. The product effect phase may change depending on product temperature and composition. The parameter PHASE TRACK indicates the increment with that the phase is adjusted: The higher this value the stronger the phase tracking. E.g. a 0.10° means 0.10 degree tracking with each product or metal signal. **Default**: 0.00° Range: 0.00 - 10.00°

Software Version 1.10a and higher

13.2. SYSTEM MENU

✓OK	**MOZZARELLA**	**5**
PRODUCT	SYSTEM MENU	✓ Level 3
IFS/HACCP	SPEED mm/s	300
	LANGUAGE	ENGLISH
	DATE/TIME MENU	✓
	AUTOSPEED MENU	✓
MENU	CIP MENU	✓
	BRC MENU	✓
TEST	IN/OUT MENU	✓
	FILTER MENU	✓
EXIT	Total 276	25 mV
	Metal 34 12 %	154.26°
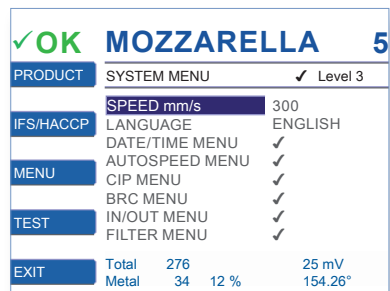
The SYSTEM MENU sets general and basic settings.

Note: *Most parameters here are factory preset. Only adjust* SPEED mm/s *and* LANGUAGE, *unless you need to adapt the metal detector to any special requirements.*

SPEED mm/s (E005)	For optimum signal evaluation the unit has to be adjusted to the velocity at which the products are passed through the sensor. A correct SPEED mm/s setting is absolutely essential. **SHARK® BD**: Adjust the setting to the belt speed at which material is passed through the metal detector. SHARK® BD supplied with conveyor HQ: SPEED mm/s is set automatically. SHARK® GF, SHARK® GF compact: 2000 mm/sec recommended. OTHERS: Set SPEED mm/s at which material is currently passed through the detector. Range: 100 - 9,999 [Millimetres per Second] **IMPORTANT NOTE**: *A correct calibration of the conveyor belt (with ± 2 m/min exactness) is absolutely essential. Otherwise lower metal detection sensitivity is the result!*
LANGUAGE (E010)	sets the language of the display texts.

13.2.1. DATE/TIME MENU

✓OK	**MOZZARELLA**	**5**
PRODUCT	DATE/TIME MENU	✓ Level 3
IFS/HACCP	SET DATE	2008-07-01
	SET TIME	11:49:36
MENU		
TEST		
EXIT	Total 276	25 mV
	Metal 34 12 %	154.26°
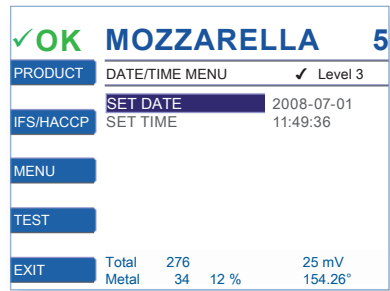
Date and time are used in the various reports of the REPORT MENU. Adjustable parameters are: SET DATE (E015) and SET TIME (E020).

13.2.2. AUTOSPEED MENU

✓OK	**MOZZARELLA**	**5**
PRODUCT	AUTOSPEED MENU	✓ Level 3
IFS/HACCP	AUTOSPEED	yes
	BELT STOP mV	500
	CAL SPEED mm/s	1800
MENU	SPEED mm/s	300
TEST		
EXIT	Total 276	25 mV
	Metal 34 12 %	154.26°
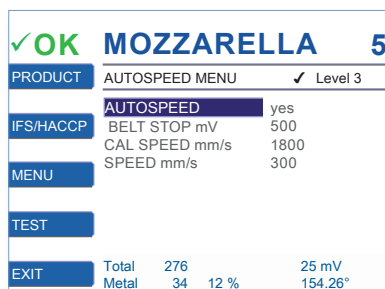
⊖ **Caution!**

Only use the AUTOSPEED MENU if you know that a 0-10V or 4 - 20 mA speed signal is connected to the AIN2 (input terminal #3).

The speed signal at AIN2 must be calibrated. The calibration defines which speed corresponds to how many millivolts.

Two values must be calibrated:

- The voltage in mV at AIN2 (input terminal #3) that corresponds to a belt speed of 0 mm/sec. (=belt stop);
- The voltage in mV at AIN2 (input terminal #3) that corresponds to a belt speed of CAL SPEED mm/s.
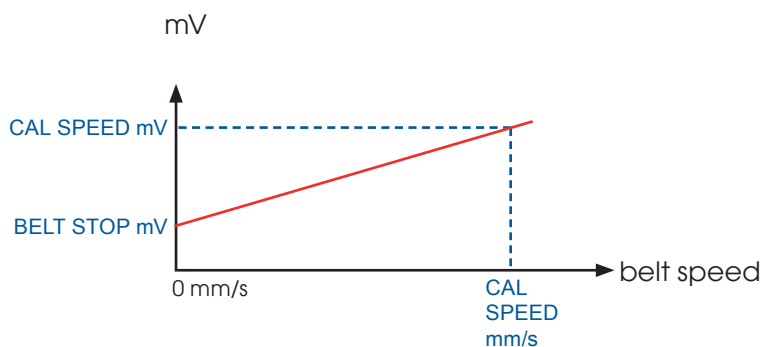
AUTOSPEED (E025)	yes activates automatic setting of SPEED mm/s.
BELT STOP mV (E030)	Set calibration voltage for belt speed = 0 mm/s (belt stop). *Hint: The yellow help text shows the current input signal at AIN2.* **Default**: 0 Range: 0 - 9,990
CAL SPEED mm/s (E035)	Enter a conveyor speed for the second setpoint. Recommended setting is 50% of maximum belt speed. *Note: Measure the current speed with a tachometer.* **Default**: 0 Range: 0 - 9,990
CAL SPEED mV (E040)	Set calibration voltage for belt speed CAL SPEED mm/s. *Hint: The yellow help text shows the current input signal.* **Default**: 0 Range: 0 - 9,990
SPEED mm/s (E005)	shows SPEED mm/s as calculated from input AIN2. For information only.

13.2.3. CIP MENU

✓OK	**MOZZARELLA**	5
PRODUCT	CIP MENU	✓ Level 3
	CIP Reject s	1
IFS/HACCP	CIP Normal s	1
	CIP Timeout min	5
MENU		
TEST		
	Total 276	25 mV
EXIT	Metal 34 12 %	154.26°
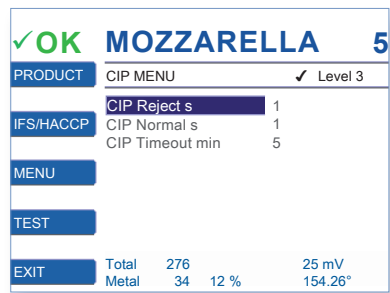
The CIP MENU (CIP = Clean In Place) is for pipeline models only (METAL SHARK® IN LIQUID).

If activated, the reject device toggles between positions "NORMAL" (production) and "REJECT" as long as the CIP input is in state HIGH. Cleaning fluid running through the product pipes cleans all interior surfaces of the reject device.

CIP Reject s (E045)	sets the time for how long the reject device is switched to position "REJECT" (in seconds). **Default**: 0 Range: 0 - 320 [Seconds]
CIP Normal s (E050)	sets the time for how long the reject device is switched to position "NORMAL" (in seconds) **Default**: 0 Range: 0 - 999 [Seconds]
CIP Timeout min (E055)	sets the maximum time the detector is in CIP-mode (in minutes). After this time, the detector will switch to normal operation even if CIP input remains HIGH. Next CIP can be activated only after CIP input has been reset to low. *Note*: Refer to parameter start cip in chapter "13.2.5. IN/OUT MENU". **Default**: 1 Range: 0 - 999 [Minutes]

13.2.4. BRC MENU
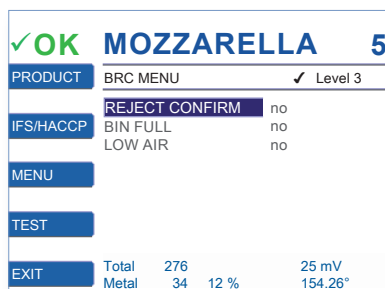
The BRC MENU allows you to configure the metal detector in order to comply with the British Retail Consortium (BRC) Food Technical Standard.

REJECT CONFIRM (E060)	**yes** enables reject monitoring (using optional photo eyes). It thus checks whether the contaminated product was indeed rejected. Status of the metal detector will switch to "ERROR" if reject device fails. *Note*: Refer to parameter reject valid in chapter "13.2.5. IN/OUT MENU".
	Default: no
BIN FULL (E065)	**yes** enables reject bin monitoring (with optional photo eye). It thus checks whether the rejection bin is full. *Note*: Refer to parameter bin full in chapter "13.2.5. IN/OUT MENU".
	Default: no
LOW AIR (E070)	**yes** enables air pressure monitoring (with optional pressure sensor). Status of the metal detector will switch to "ERROR" (i.e. relay K2 "OFF") if the air pressure is too low. *Note*: Refer to parameter low air in chapter "13.2.5. IN/OUT MENU".
	Default: no

13.2.5. IN/OUT MENU
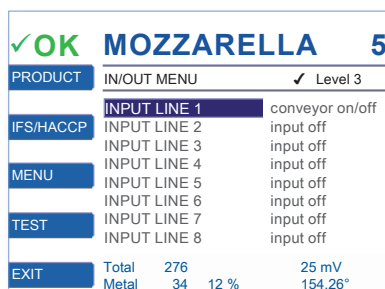
Setup of the input and output switching lines of the metal detector. Set up the parameters according to the devices connected to IN1 - IN8 and OUT1 - OUT 8 terminals on the mainboard.

Note: For more information refer to "7.3. Terminals on the Mainboard".
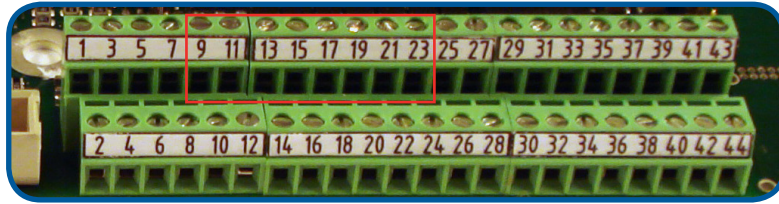
Terminals on SHARK mainboard corresponding to INPUT LINE 1 - INPUT LINE 8:

INPUT LINE 1 = Terminal 9	INPUT LINE 3 = Terminal 13	INPUT LINE 5 = Terminal 17	INPUT LINE 7 = Terminal 21
INPUT LINE 2 = Terminal 11	INPUT LINE 4 = Terminal 15	INPUT LINE 6 = Terminal 19	INPUT LINE 8 = Terminal 23

Functions of INPUT LINE 1 - INPUT LINE 8 (E080 - E115):

met/err reset	HIGH: Return to normal operation mode after METAL or ERROR
conveyor on/off	Belt control push button input (START / STOP / RESET)
start teach	HIGH: Start TEACH
reject test	HIGH: Trigger reject device now.
reject valid	Connect feedback signal from reject device. ERROR if no signal transition after METAL OUT
reject sync	Photo eye, triggers pusher to product centre
reject safety	LOW: Reject device is locked in position NORMAL, e.g. during cleaning.
keypad lock	HIGH: Keyboard is locked, no data entry possible. Typical application: Key switch.
low air	Monitors compressed air. LOW for more than 30sec.: Triggers Error 7: Low Air (refer to "*14.1. Error Messages*").
start cip	HIGH: Activates CIP mode (refer to "*13.2.3. CIP MENU*")
bin full	Monitors reject bin. HIGH for more than 30 sec.: Triggers Error 6: Bin Full (refer to "*14.1. Error Messages*")
met count reset	HIGH: Resets METAL COUNTER (A020)
false trip	HIGH: Sends a false alarm message to the SHARKNET® software
product 120	HIGH: PRODUCT NR. (D005) is set to 120. LOW: PRODUCT NR. (D005) is set to original number.
met/err key	HIGH: Return to normal operation mode after METAL or ERROR (only available with option: key switch)
booster ok	Monitors booster. LOW triggers Error 17: Booster Error (refer to "*14.1. Error Messages*") ***Note***: *Only change this input when advised by CASSEL.*
belt splice	HIGH: Sets sensitivity to SPLICE SENSE mV (E270) LOW: Sets sensitivity to METAL SENSE mV (D120)
product LS	Photo eye signals product`s edges during TEACH Step 2: Learning

test no reject	HIGH: activates metal test mode (only with option: key switch).
	During test mode the conveyer is immidiately stopped when metal ist detected (output 'error CW') - however, the metal alarm is neither counted nor entered in the event report.
	Timeout of the test mode is controlled by CIP Timeout min - after this time has elapsed normal metal detection continues. While the test mode is active **TEST** is displayed.
input off	Input is not active.
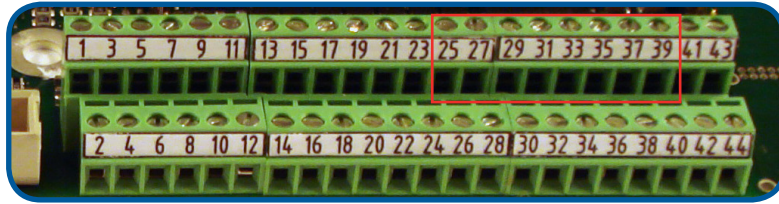
Terminals on SHARK mainboard corresponding to OUTPUT LINE 1 - OUTPUT LINE 8:

OUTPUT LINE 1 = Terminal 25	OUTPUT LINE 3 = Terminal 29	OUTPUT LINE 5 = Terminal 33	OUTPUT LINE 7 = Terminal 37
OUTPUT LINE 2 = Terminal 27	OUTPUT LINE 4 = Terminal 31	OUTPUT LINE 6 = Terminal 35	OUTPUT LINE 8 = Terminal 39

Functions of OUTPUT LINE 1 - OUTPUT LINE 8 (E120 - E155):

metal	HIGH if metal detected, refer to "13.1.5. REJECT MENU" for details
metal inverse	LOW if metal detected.
error	HIGH during normal operation, LOW if detector is not in normal operation
error inverse	LOW during normal operation, HIGH if detector is not in normal operation
met+err	HIGH if metal alarm or unit not in normal operation, LOW during normal operation
met+err inv.	LOW if metal alarm or unit not in normal operation, HIGH during normal operation
metal zero del	HIGH if metal detected, no DELAY mm (refer to "13.1.1. REJECT MENU")
pv test	HIGH if last sensitivity test more than PV FREQ HOURS ago (refer to "11.2. TEST - Check Metal Detector's Performance")
dual freq	For dual frequency detectors only.
teach confirm	HIGH if TEACH ended successfully ("TEACH Successfull" displayed)
cip out	HIGH if detector is in CIP mode (refer to "13.2.3. CIP MENU" for details)
start conveyor	HIGH if conveyor on/off received a start signal
pusher	The outputs metal and pusher switch to active at the same time: However, pusher switches back to inactive already after 1/3 of the time of DURATION ms (but at least 40 ms). This way a pneumatic pusher is able to return to normal position during DURATION ms.
big metal	HIGH if big metal piece is detected - only BIG pba.
booster on	HIGH switches booster on
conv. forward	Internal function, not for common use
conv. reverse	Internal function, not for common use
metal CW	HIGH: if metal detected LOW: automatically after 140 ms.
error CW	HIGH: like 'error'. When metal test mode is activated via key switch, also when metal is detected. This way the conveyor of the checkweigher stops when metal is detected during test mode.
output off	Output not active. Output remains LOW.

13.2.6. FILTER MENU

✓OK	MOZZARELLA	5
PRODUCT	FILTER MENU	✓ Level 3
IFS/HACCP	VIBRATION mV	5
	VIBRATION FILTER	off
	BP FILTER	CCF
	LP FILTER	off
MENU	GF MODE	off
TEST		
EXIT	Total 276	25 mV
	Metal 34 12 %	154.26°
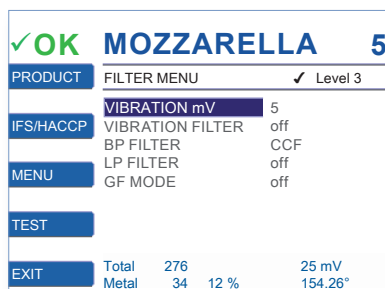
The FILTER MENU sets filters to improve the detection reliability and suppress noise.

VIBRATION mV (E160)	**To set** VIBRATION mV: 1. Set PRODUCT 000, AMP X% 100, AMP Y% 100 2. Run the production line or the conveyor, but without products and without metal. 3. Read out the peak mV level. 4. Set VIBRATION mV to the maximum peak mV level plus 30%. **Default**: 10 Range: 3 - 2,000
VIBRATION FILTER (E165)	blanks out mechanical vibrations of the sensor head. yes activates vibration filter. The value of VIBRATION mV (above) controls the filter strength: VIBRATION mV **increased**: Better suppression of vibration noise, lower detection sensitivity. VIBRATION mV **decreased**: Less suppression of vibration noise, better detection sensitivity. Default: no
	Note: Only change this filter when advised by CASSEL.
BP FILTER (E170)	no filter = filter is deactivated. Do not use unless clearly instructed by CASSEL FFT = special Filter mode. Do not use unless clearly instructed by CASSEL CCF = default **Default**: CCF
LP FILTER (E175)	yes = Lowpass filter activated. **Default**: yes

GF MODE (E180)	yes enables fast metal detection. Gives a wide speed range. (for GF or fast applications)
	no = normal applications
	Default: no (conveyor applications with defined belt speed)
	        yes (applications with undefined speed)
	        yes (all gravity feed applications)

13.3.   FACTORY MENU

The FACTORY MENU adopts the electronic cards to the sensor head.

Note: *Never touch these parameters. All parameters here are factory preset. Therefore, Password Level 4 is required to change settings in the menu. Level 3 users can enter the menu and read the parameters.*

14.   Trouble Shooting

14.1.   Error Messages
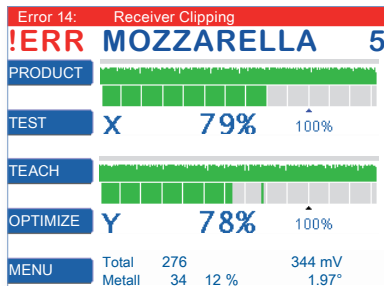
In case of an error:

- the Error-LED lights up,
- the screen indicates **!ERR**,
- an error message is displayed.

Note*: Please write down the number of the error and talk to the company technician or call a service technician of CASSEL Messtechnik.*

Error #	Error Text	Cause	Remedy	Confirmation
Error 1:	Comp. Pre	• Sensor out of the alignment. • Mainboard damaged. • Big metal object in the detector.	• Remove big metal object in the detector • Contact technician	• Turn on/off metal detector
Error 2:	Comp. Fine	• Mainboard damaged.	• Contact technician	• Turn on/off metal detector
Error 3:	Signal Clip	• Signal permanently too high for one minute.	• Use other products • Contact technician	• Confirm with OK • Restart teach process
Error 4:	Reject	• Reject device has been triggered but the reject sensor did not detect the rejection.	• Confirm with OK and repeat test • Contact technician	• Confirm with OK
Error 5:	PVS Test Elapsed	• Performance validation test not done within preset period of time.	• Confirm with OK and repeat test	• Confirm with OK • Error reappears, if period of time has expired and the PV test was unsuccessful
Error 6:	Bin Full	• The bin is full or a product blocks the sensor.	• Empty bin • Contact technician	• Confirm with OK • Error message reappears after 30 seconds, if bin still full
Error 7:	Low Air	• Air pressure monitor signals low pressure.	• Check air pressure supply • Contact technician	• Confirm with OK • Error message reappears after 30 seconds, if not enough air pressure

Error #	Error Text	Cause	Remedy	Confirmation
Error 9:	Keyboard	• Key is jammed or keyboard connector is loose.	• Contact technician	• Confirm with OK • Error message appears until keyboard is replaced
Error 10:	Memory	• Memory problem, parameters can not be saved	• Turn on/off metal detector • Contact technician	• Confirm with OK • Error message appears until memory is replaced
Error 12:	Check Belt	• Conveyor belt should run but does not.	• Contact technician	• Push Start belt button
Error 13:	Output Wiring	• Overload protection for outputs is triggered.	• Contact technician	• Turn on/off metal detector
Error 14:	Receiver Clipping	• Receiver receives a signal that is too large.	• Contact technician	• Turn on/off metal detector
Error 15:	Sender Clipping	• Transmitter is overloaded.	• Contact technician	• Turn on/off metal detector
Error 16:	Transmitter Fault	• External transmitter amplifier signals fault (e.g. SPD)	• Contact technician	• Confirm with OK
Error 17:	Sender Power	• Error in external amplifier	• Contact technician	• Confirm with OK • Turn on/off metal detector
Error 18:	Mat Height Input	• Physical connection erroneous	• Check cable connection	• Confirm with OK • Turn on/off metal detector
Error 19:	Autospeed Input	• Physical connection erroneous	• Check cable connection	• Confirm with OK • Turn on/off metal detector

14.2. Reset to Default Values

14.2.1. Passwords and Language

Press OK, ESC and F5 for 1.5 seconds during start up (SHARK logo is displayed) to reset all passwords to the default values (CM0001 - CM0003). Also LANGUAGE is set to English.

14.2.2. Factory Settings

Press OK, ESC and F1 for 1.5 seconds during start up (SHARK logo is displayed) to reset all parameters to the default settings preset by the factory.

14.3.   Problem Solving

14.3.1.   Problem: Still Considerable Metal Alarms After TEACH

Solution:

1. TEACH again. If metal alarms occur again:
2. Switch main screen to 2D plot (refer to "*8.2. The Main Screens*")
3. OPTIMIZE (refer to "*11.4. OPTIMIZE – Improve Stability & Sensitivity*")
4. FREEZE (refer to "*11.4.2. Optimizing with the 2D Plot*")
5. Add to Teach Area (+) (refer to "*11.4.2.2. Add to Teach Area*")

14.3.2.   Problem: Still Few Metal Alarms After TEACH

Solution:

1. TEACH again. If metal alarms occur again:
2. Switch main screen to bar graphs (refer to "*8.2. The Main Screens*")
3. OPTIMIZE (refer to "*11.4. OPTIMIZE – Improve Stability & Sensitivity*")
4. Adjust TOL. X and TOL. Y until signal of normal products = below 80% (refer to "*11.4.1. Optimizing with the Histogram*")

14.3.3.   Problem: TEACH ends After Short Period of Time

Problem: TEACH ends after short period of time although no products have been fed through sensor

Solution: Increase TEACH SENSE mV (D070) (refer to "*13.1.2. TEACH SETUP*")

14.3.4.   Problem: Poor Metal Sensitivity After TEACH

Solution:

1. Is SPEED mm/s (E005) set up correctly? (refer to "*13.2. SYSTEM MENU*")
2. TEACH again. If problem still occurs:
3. Switch main screen to bar graphs (refer to "*8.2. The Main Screens*")
4. OPTIMIZE (refer to "*11.4. OPTIMIZE – Improve Stability & Sensitivity*")
5. Does the display show below 60% when the product is fed through the sensor? (refer to "*8.2. The Main Screens*")
6. Adjust TOL. X and TOL. Y until signal of normal products = between 60 and 80% (refer to "*11.4.1. Optimizing with the Histogram*")

15. Maintenance and Regular Inspections

15.1. Maintenance

The metal detector is a sensitive measuring device which serves to protect other machinery from damage, thus preventing expensive, unscheduled interruptions of production. This manual describes how to install, operate and adjust the sensitivity. The conveyor belt upon which the metal detector is mounted is designed to ensure that the detector works accurately. The metal detector will generally work safely and reliably without having to make additional adjustments after the initial commissioning.

15.2. Regular Inspections

Regular tests of the metal detector's functions are very important to ensure safe operations. The detector must be tested at least on a weekly basis. Additionally, it has to be tested after each maintenance stop or after works have been performed near the detector. If the detector does not function appropriately eliminate the malfunctions immediately; if not, machines protected by the detector must be stopped.

It is recommended to regularly test the metal detector with standardised test objects and to keep records of these tests in a log book. Metal testing spheres are generally supplied with the detector.

A suitable metal testing object and a testing schedule should be established for the examination:

- The testing object should be a sphere of the smallest diameter which detection is required. The sphere can be glued to a piece of plastic or may be cast in. The sphere is passed through the detector together with the product in order to observe whether a metal detection signal is issued.
- The testing schedule should state when the detector is to be tested and by whom. Example: The electrician on duty on a given shift has to test the detector using the testing object one hour after the start of each shift. The test results are recorded in the log book with the date, time and signature. Example: Test object recognised, 24 August 2007, 08.30, signed, Smith.

15.3. Notes

Normally, CASSEL commissions to adjust the metal detector to find the smallest metal pieces possible. Therefore please consider the following notes:

Keep the conveyor belt clean: Finger marks and shoe prints, visible or not, may contain metal particles.

Do not weld or grind near the detector or the conveyor without having covered the conveyor belt with e.g. cardboard. Sparks may burn into the surface of the conveyor and thus permanently contaminate the belt.

Do not change the conveyor belt construction without having asked the manufacturer of detector and belt.

16. Annex

16.1. Declarations

16.1.1. CE - Declaration of Conformity

The producer   CASSEL Messtechnik GmbH

         In der Dehne 10

         37127 Dransfeld, Germany

certifies herewith that the machines metal detector type METAL SHARK® 2 BD

are in conformity with the provisions of the following EC Directive(s) when installed in accordance with the installation instructions contained in the product documentation:

- EG-Machinery Directive 2006/42/EC
- EC-Directive electromagnetic compatibility 2006/95/EC
- Electromagnetic Compatibility 2004/108/EC

The equipment complies with:

Safety:

EN ISO 12100-1	Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology
EN ISO 12100-2	Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles
EN 60204-1	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
EN 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements
EN 60529	Degrees of protection provided by enclosures (IP code)

Electromagnetic Compatibility (EMC) according to 61000-6-2/4:

EN 61000-3-3	Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current <=16 A per phase and not subjected to conditional connection
EN 61000-4	Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques
EN 61000-6-2	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
EN 61000-6-4	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments
EN 55011	Industrial scientific and medical (ISM) radio-frequency equipment - Electromagnetic disturbance characteristics - Limits and methods of measurement

Herewith we declare that we followed the relevant safety norms and requirements for technical safety and for explosion prevention for the intended use when constructing and producing this metal detector.

Structural changes which have effects on the technical information in this manual and on the intended utilisation, and therefore convert the machine considerably, make this declaration of conformity invalid!

Dransfeld, 27. October 2009
Cord Cassel, Managing Director

16.1.2.   Declaration of Manufacturer

The producer   CASSEL Messtechnik GmbH

In der Dehne 10

37127 Dransfeld, Germany

certifies herewith that the machines   metal detector type METAL SHARK® 2 BD

are in conformity with the provisions of the following EC Directive(s) when installed in accordance with the installation instructions contained in the product documentation:

- EC-Machinery Directive 2006/42/EC
- EC-Directive electromagnetic compatibility 2006/95/EC
- Electromagnetic Compatibility 2004/108/EC

Herewith we declare that the described product is intended to be incorporated into machinery and must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the provisions of the EU-directives 2006/42/EC.

The equipment complies with:

Safety:

EN ISO 12100-1	Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology
EN ISO 12100-2	Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles
EN 60204-1	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
EN 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements
EN 60529	Degrees of protection provided by enclosures (IP code)

Electromagnetic Compatibility (EMC) according to 61000-6-2/4:

EN 61000-3-3	Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current <=16 A per phase and not subjected to conditional connection
EN 61000-4	Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques
EN 61000-6-2	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
EN 61000-6-4	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments
EN 55011	Industrial scientific and medical (ISM) radio-frequency equipment - Electromagnetic disturbance characteristics - Limits and methods of measurement

Herewith we declare that we followed the relevant safety norms and requirements for technical safety and for explosion prevention for the intended use when constructing and producing this metal detector.

Structural changes which have effects on the technical information in this manual and on the intended utilisation, and therefore convert the machine considerably, make this declaration of manufacturer invalid!

Dransfeld, 27. October 2009
Cord Cassel, Managing Director

Parameter List **METAL SHARK® 2 BD/** Software Version **1.10a**

Project: _____   Date: _____   Model: _____   Unit #: _____

✔ 1-3 = Required Password Level to enter this menu

Code	Name	Description	Read/Write	Setting
		REPORT MENU (✔ 1)		
A005	IFS/HACCP REPORT	Quality inspection report, printed to screen or printer	R	
A010	METAL REPORT	Shows report about last metal alerts	R	
A015	EVENT REPORT	Shows information about last events	R	
A020	METAL COUNTER	Increased by each metal detection	R	
A025	TOTAL COUNTER	Increased when product passes sensor	R	
A030	PRINT	Print mode	R/W	1 off 2 report 3 one by one 4 SharkDiag 5 SharkNet
A035	INTERFACE	Interface protocol	R/W	1 RS232 2 Ethernet
A040	BAUDRATE RS232	Speed of the interface	R/W	1 9600 2 14400 3 57600 4 115200 5 230400
A045	SHARKNET UNIT #	Number of the controller when in SHARKNET	R/W	
A050	MAIN SCREEN	Defines the main screen that is shown when metal detector is started	R/W	1 2D plot 2 bar graphs 3 scope
A055	HISTOGRAM LIMIT %	Only signals exceeding this threshold appear in histogram	R/W	
A060	INFO SOFTWARE	Shows software version	R	

Code	Name	Description	Read/Write	Setting
TEST MENU (✔ 2)
B005	AUTO PVS TEST	Performance Validation System Test	R/W	1 yes 2 no
B010	PVS FE mm	Size of FE-teststick to be used	R/W	
B015	PVS FE max %	Max signal, that is accepted as FE-teststick	R/W	
B020	PVS NonFE mm	Size of N-FE-teststick to be used	R/W	
B025	PVS NonFE max %	Max signal, that is accepted as N-FE-teststick	R/W	
B030	PVS SS mm	Size of SS-teststick to be used	R/W	
B035	PVS SS max %	Max signal, that is accepted as SS-teststick	R/W	
B040	PVS FREQ hrs	Time between two PVS tests	R/W	
B045	PVS WINDOW min	Max duration of PVS test	R/W	
B050	PVS ERROR COUNT	Max number of trials	R/W	
B055	PVS COUNT METAL	Teststick increases metal counter	R/W	1 yes 2 no
B060	PVS USE PRODUCT	PVS Test with product	R/W	1 yes 2 no

Code	Name	Description	Read/Write	Setting
PASSWORD (MENU) (✔ 2)
C005	OPEN LEVELS	No password protection up to this level	R/W	
C010	LEVEL 1 PASSWORD	Password for Level 1 user	R/W	
C015	LEVEL 2 PASSWORD	Password for Level 2 user	R/W	
C020	LEVEL 3 PASSWORD	Password for Level 3 user	R/W	
C025	LOGOUT	Logs out current user	R	

Code	Name	Description	Read/Write	Setting
PRODUCT MENU (✔ 2)
D005	PRODUCT NR.	Product number	R/W	
D010	PRODUCT NAME	Product name	R/W	
D015	PRODUCT IS...	Product characteristic (sets product adjusted settings)	R/W	1 dry 2 wet 3 salty 4 frozen 5 melting 6 alu foil 7 plastic 8 vibration 9 shock 10 neutral
D020	FREQ. SELECT	Selects frequency for product	R/W	
D025	TEACH MODE	Sets whether to teach quick or precise	R/W	1 quick 2 precise

Code	Name	Description	Read/Write	Setting
PRODUCT MENU ▶ REJECT MENU (✔ 3)					
D035	DELAY mm	Reject delay in millimeter, calculated depending on SPEED	R/W	
D040	DURATION ms	Reject duration in milliseconds	R/W	
D045	METAL CONTACT	Programs the function of the metal alarm outputs	R/W	1 pulse 2 gf1 3 gf2 4 mesep 5 inline 6 hold 7 push1 8 push2 9 push3
D050	PUSHER TOL mm	Trigger tolerance for photo sensor	R/W	
D055	METAL-PHOTO mm	Distance metal detection – pusher's photo sensor	R/W	
D060	BELT STOP PUSH	Conveyor stops during rejection	R/W	1 yes 2 no
PRODUCT MENU ▶ TEACH SETUP (✔ 3)					
D065	SENSE MIN mV	Signals below this value are ignored (relat. to AMPLIFICATION X, Y = 100%)	R/W	
D070	TEACH SENSE mV	Sensitivity during teach (relating to AMPLIFICATION X, Y = 100%)	R/W	
D075	QUICK COUNT	Min number of products when teaching quick	R/W	
D080	PRECISE COUNT	Min number of products when teaching precise	R/W	
D085	TEACH TIME s	Duration of teach STEP1 and STEP2	R/W	
D090	TEACH EXTERN	Enables external product teach	R/W	1 yes 2 no
D095	TEACH REJECT	Enables rejection during teach	R/W	1 yes 2 no
D100	REMOTE PRODUCT	Activates remote product selection	R/W	1 yes 2 no
D105	AUTOMATIC TEACH	One product used for teach process (only possible with forwards/backwards belt control)	R/W	1 yes 2 no
D110	CONV. LENGTH mm	Conveyor length, for AUTOMATIC TEACH	R/W	
D115	AUTO FREQUENCY	Auto. frequency selection during teach	R/W	1 yes 2 no
D117	TEACH PHOTO mm	Distance from photo cell to sensor end	R/W	
PRODUCT MENU ▶ ADVANCED (✔ 3)					
D120	METAL SENSE mV	Metal detection above this threshold	R/W	
D125	PRODUCT X TOL.	Product compensation X (additionally to TOL X)	R/W	
D130	PRODUCT Y TOL.	Product compensation Y (additionally to TOL Y)	R/W	
D135	AMPLIFICATION X	Amplification X-channel (product signals)	R/W	
D140	AMPLIFICATION Y	Amplification Y-channel (metal signals)	R/W	
D145	ATTENUATION	Reduces sensor signal, e.g. at strong product effects	R/W	
D150	PHASE	Phase for product compensation	R/W	
D155	PHASE TRACK	Tracking steps when product phase drifts	R/W	

Code	Name	Description	Read/Write	Setting
SYSTEM MENU (✔ 3)				
E005	SPEED mm/s	Speed of product through sensor. IMPORTANT – Must match with real speed.	R/W	
E010	LANGUAGE	Sets language	R/W	

Code	Name	Description	Read/Write	Setting
SYSTEM MENU ▶ DATE/TIME MENU (✔ 3)				
E015	SET DATE	Date used in all reports	R/W	
E020	SET TIME	Time used in all reports	R/W	

Code	Name	Description	Read/Write	Setting
SYSTEM MENU ▶ AUTOSPEED MENU (✔ 3)				
E025	AUTOSPEED	Activates autospeed (only belts with frequency inverter)	R/W	1 yes 2 no
E030	BELT STOP mV	Calibrates belt speed (Terminal 3, AIN2) at 0 mm/sec	R/W	
E035	CAL SPEED mm/s	Enter calibrated belt speed	R/W	
E040	CAL SPEED mV	Calibrates belt speed (Terminal 3, AIN2) of set belt speed	R/W	
E005	SPEED mm/s	Speed of product through sensor. IMPORTANT – Must match with real speed.	R	

Code	Name	Description	Read/Write	Setting
SYSTEM MENU ▶ CIP MENU (✔ 3)				
E045	CIP Reject s	Clean in place: reject open timing (seconds)	R/W	
E050	CIP Normal s	Clean in place: timing for normal position	R/W	
E055	CIP Timeout min	Clean in place: reject normal timing (seconds)	R/W	

Code	Name	Description	Read/Write	Setting
SYSTEM MENU ▶ BRC MENU (✔ 3)				
E060	REJECT CONFIRM	Checks if product was rejected (photo sensor needed)	R/W	1 yes 2 no
E065	BIN FULL	Checks if bin is full (photo sensor required)	R/W	1 yes 2 no
E070	LOW AIR	Checks if enough air pressure (air jet required)	R/W	1 yes 2 no

Code	Name	Description	Read/Write	Setting

SYSTEM MENU ▶ IN/OUT MENU (✔ 3)

Code	Name	input off	met/err reset	conveyor on/off	start teach	reject test	reject valid	reject sync	reject safety	keypad lock	low air	start cip	bin full	met count reset	false trip	product 120	met/err key	booster ok	belt splice	product LS	test no reject
E080	INPUT LINE 1																				
E085	INPUT LINE 2																				
E090	INPUT LINE 3																				
E095	INPUT LINE 4																				
E100	INPUT LINE 5																				
E105	INPUT LINE 6																				
E110	INPUT LINE 7																				
E115	INPUT LINE 8																				

Code	Name	output off	metal	metal inverse	error	error inverse	met+err	met+err inv.	metal zero del	pv test	dual freq	teach confirm	cip out	start conveyor	pusher	conv. forward	conv. reverse	big metal	booster on	metal clocked	metal CW	error CW
E120	OUTPUT LINE 1																					
E125	OUTPUT LINE 2																					
E130	OUTPUT LINE 3																					
E135	OUTPUT LINE 4																					
E140	OUTPUT LINE 5																					
E145	OUTPUT LINE 6																					
E150	OUTPUT LINE 7																					
E155	OUTPUT LINE 8																					

SYSTEM MENU ▶ FILTER MENU (✔ 3)

Code	Name	Description	Read/Write	Setting
E160	VIBRATION mV	makes VIBRATION FILTER stronger (increase mV) or weaker (decrease mV)	R/W	
E165	VIBRATION FILTER	Avoids false trips if sensor is subjected to vibrations	R/W	1 yes 2 no
E170	BP FILTER	Shall always be CCF, unless specified other by Cassel CASSEL	R/W	1 no filter 2 FFT 3 CCF
E175	LP FILTER	Avoids false trips from VFDs and similar noise sources	R/W	1 yes 2 no
E180	GF MODE	Enables superfast metal detection for gravity feed	R/W	1 yes 2 no

Code	Nom	Description	Lecture/Ecriture	Réglage
		MENU USINE (✔ 3)		

		MENU USINE ▶ SENSOR CALIB. (✔ 3, NEVER CHANGE!)		
F005	SENSOR FIELD mm	Dimensions du capteur	R/W	
F010	BALANCE FACTOR	Facteur régulation balance du capteur	R/W	
F015	FREQUENCY 1[Hz]	Frequence résonance capteur	R/W	
F020	PHASE 1 CALIB.	Phase zéro calibration capteur	R/W	
F025	FREQUENCY 2[Hz]	Frequence résonance capteur	R/W	
F035	PHASE 2 CALIB.	Phase zéro calibration capteur	R/W	
F040	FREQUENCY 3[Hz]	Frequence résonance capteur	R/W	
F045	PHASE 3 CALIB.	Phase zéro calibration capteur	R/W	
F050	FREQUENCY 4[Hz]	Frequence résonance capteur	R/W	
F055	PHASE 4 CALIB.	Phase zéro calibration capteur	R/W	
F060	FF BOARD REV.	Choisit écran principal pour capteur multifréquence	R/W	
F065	mV CALIBR.	mV calibration factor 0.01 - 1.99. standard = 1.00	R/W	

About CASSEL Messtechnik GmbH

As a manufacturer CASSEL is committed to highest quality standards. For more than ten years our goal has been to ensure the quality of your products. We have earned our reputation by protecting yours.

We supply customers in different industries worldwide such as Foods, Plastics, Pharmaceuticals, Textile, Timber and Mining.

Our headquarters and state of the art manufacturing facility are located near Hanover in the heart of Germany. Each year we manufacture and deliver over 1000 metal detection systems.

Approximately 80% of the production is heading for export markets. We have a worldwide network of partners and representations. This way we ensure that you get the very best service and support no matter where you use one of our metal detectors.

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About this manual

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